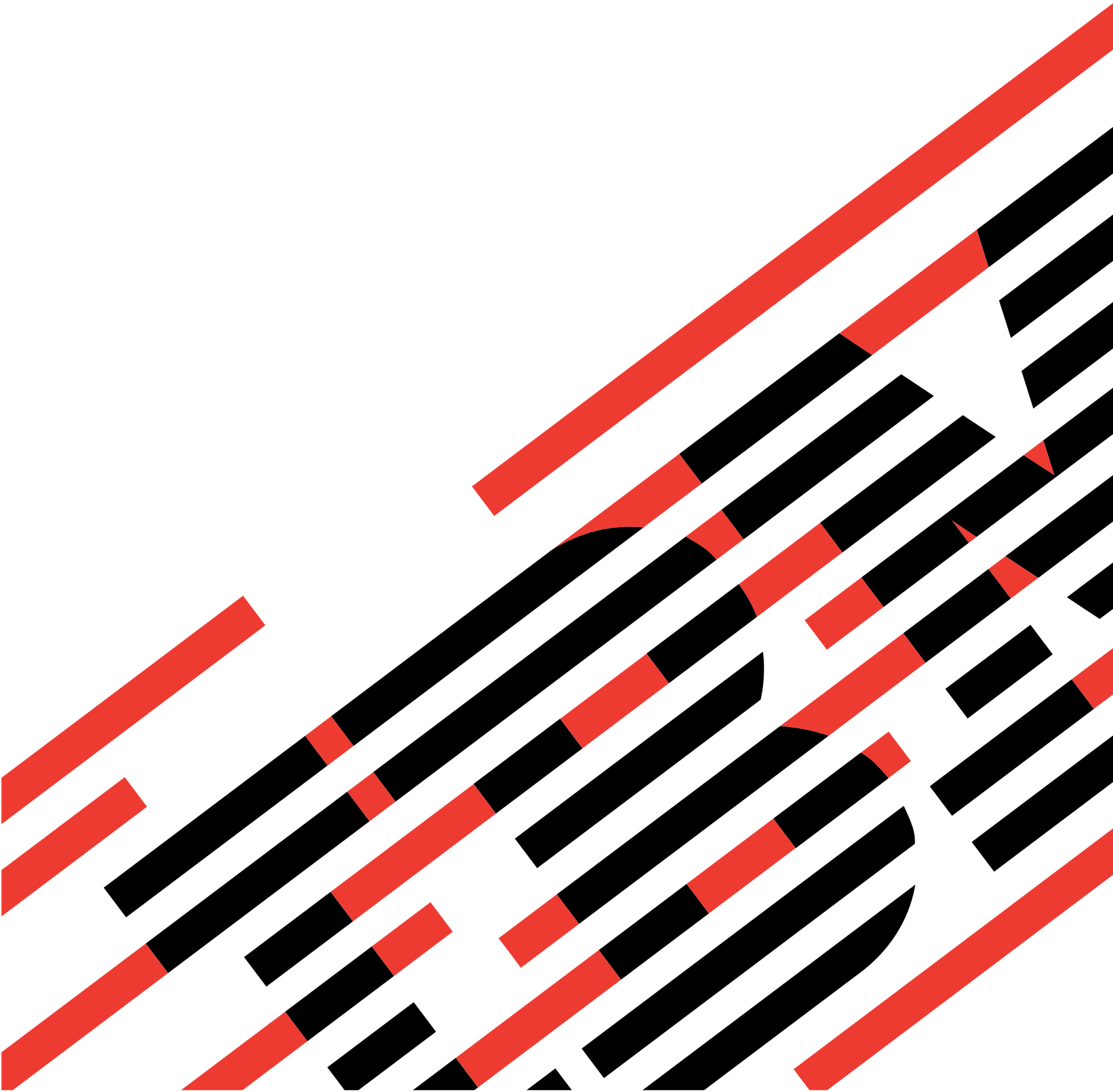
IBM xSeries 225
Type 8647

Hardware Maintenance Manual and Troubleshooting Guide



IBM

@server

IBM xSeries 225
Type 8647

Hardware Maintenance Manual and Troubleshooting Guide

Note

Before using this information and the product it supports, be sure to read Appendix C, “Notices”, on page 159.

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About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the IBM® @server xSeries™ 225.

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM xSeries products. See Chapter 7, “Parts listing xSeries 225 Type 8647”, on page 117 to determine if the component being replaced is a customer replaceable unit (CRU) or a field replacable unit (FRU).

Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions. See “Safety information” on page 125.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Accertarsi di leggere tutti gli avvisi di attenzione e di pericolo prima di effettuare qualsiasi operazione.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Lea atentamente todas las declaraciones de precaución y peligro ante de llevar a cabo cualquier operación.

Online support

You can download the most current diagnostic, BIOS flash, and device driver files from http://www.ibm.com/pc/support on the World Wide Web.

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Chapter 1. General information

Your IBM @server xSeries 225 Type 8647 server is a high-performance server that can be upgraded to a symmetric multiprocessing (SMP) server through a microprocessor upgrade. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 225 server contains several IBM X-Architecture™ technologies, which help increase server performance and reliability.

Your server comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your server model and other IBM server products at http://www.ibm.com/pc/us/eserver/xseries/.

Your server serial number and model number are located on labels on the bottom of the server and on the front below the bezel. You will need these numbers when you register your server with IBM. The information label containing the serial number, machine type, model number, and agency marks for your server is located on the bottom of the server.

Related publications

This *Hardware Maintenance Manual and Troubleshooting Guide* contains information to help you solve the problem yourself or to provide helpful information to a service technician.

In addition to this *Hardware Maintenance Manual and Troubleshooting Guide*, the following xSeries 225 Type 8647 documentation is provided with your server:

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*
  This printed publication contains the instructions to install your server in a rack.
- *Safety Book*
  This multilingual publication is provided in Portable Document Format (PDF) on the IBM *xSeries Documentation* CD. It contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- *User's Guide*
  This publication is provided in PDF on the IBM *xSeries Documentation* CD. It contains general information about your server, including information about features, how to configure your server, how to use the *ServerGuide™ Setup and Installation* CD, and how to get help.
- *Option Installation Guide*
  This publication is provided in PDF on the IBM *xSeries Documentation* CD. It contains instructions to install, remove, and connect optional devices supported by your server.

Depending on your server model, additional publications might be included on the IBM *xSeries Documentation* CD.

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Notices and statements in this book

The caution and danger statements used in this book also appear in the multilingual *Safety Information* book provided on the IBM *xSeries Documentation* CD. Each caution and danger statement is numbered for easy reference to the corresponding statements in the safety book.

The following types of notices and statements are used in this book:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following table provides a summary of the features and specifications of your server. Depending on your server model, some features might not be available, or some specifications might not apply.

You can use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor that is on the system board.

Table 1. Features and specifications

Microprocessor:
- Intel Xeon™ Processor
- 512 KB Level-2 cache
- 400 MHz or 533 MHz front-side bus (FSB)
- Support for up to two microprocessors

Memory:
- Minimum: 256 MB
- Maximum: 8 GB
- Type: PC2100, double-data-rate (DDR)
- Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved

Drives standard:
- Diskette: 1.44 MB (two mode)
- CD-ROM: IDE

Expansion bays:
- Six open hot-swap, slim-high, 3.5-inch drive bays (some models)
- Four slim-high, 3.5-inch drive bays with one hard disk drive installed (some models)
- Two 5.25-inch bays (CD-ROM drive installed in one bay)
- One 3.5-inch removable-media drive bay (diskette drive installed)

PCI expansion slots:
- Four PCI-X 100 MHz/64-bit
- One PCI 33 MHz/32-bit

Cooling:
Three speed-controlled fans

Upgradeable microcode:
BIOS upgrades (when available) can update EEPROMs on the system board

Integrated functions:
- Support for IBM Remote Supervisor Adapter
- Broadcom 5703 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Two serial ports
- One parallel port
- Integrated SCSI controller with RAID capabilities and two Ultra320 SCSI ports (one internal, one optional external)
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear of enclosure)
- Keyboard port
- Mouse port
- Audio ports (rear)
  - Line out
  - Mic
  - Line in
- ATA-100 dual-channel IDE controller
- ATI Rage XL video (mini-PCI)
  - Compatible with SVGA and VGA
  - 8 MB video memory

error LEDs:
- Fans
- Memory
- Microprocessors

Power supplies:
- Hot-swap (some models)
  Standard: Two 350 watt output (115-230 V ac) for redundancy
- Non-hot-swap (some models)
  Standard: One 425 watt output (115-230 V ac)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.15 kVA (all models)
  - Maximum: 0.80 kVA with standard power supply, 0.62 kVA with optional redundant hot-swap power supplies

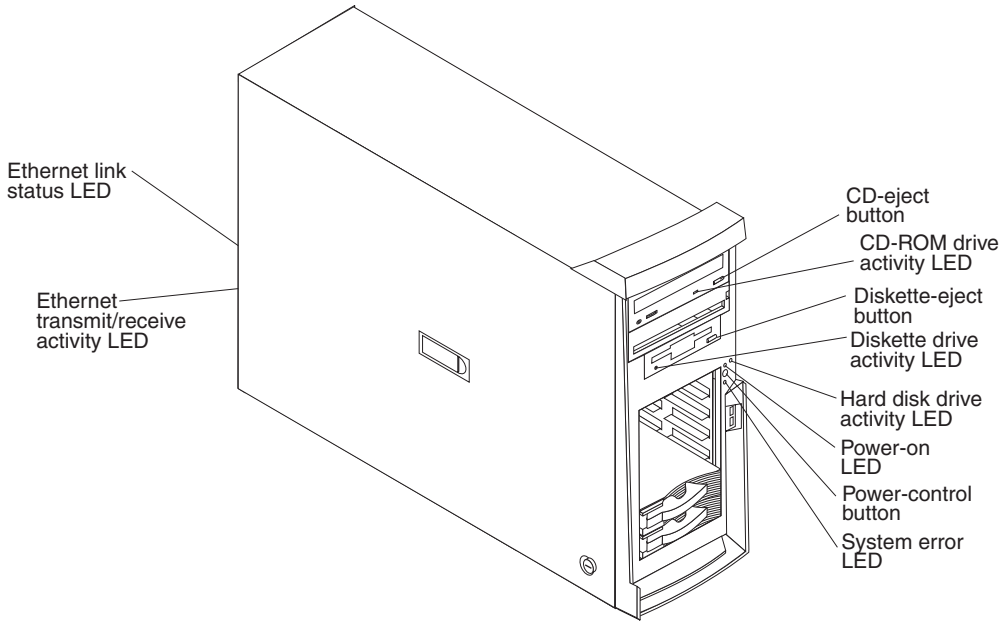
Heat output:
Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 341 Btu/hour (100 watts)
- Maximum configuration: 2455 Btu/hour (720 watts) with standard power supply, 1910 Btu/hour (560 watts) with optional redundant hot-swap power supplies

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 2134 m (7000 ft)
  - Server off: -40° to +60°C (-40° to 140°F) Maximum altitude: 2134 m (7000 ft)
- Humidity (operating and storage): 8% to 80%

Acoustical noise emissions:
- Sound power, idle: 5.3 bel maximum
- Sound power, operating: 5.6 bel maximum

Size:
- Height: 440 mm (18.4 in.)
- Depth: 660 mm (26 in.)
- Width: 217 mm (6.5 in.)
- Weight: 20 kg (44 lb) to 25.8 kg (57 lb) depending upon configuration

Controls and indicators



CD-eject button
Press this button to release a CD from the CD-ROM drive.

CD-ROM drive activity LED
When this LED is lit, it indicates that the CD-ROM drive is in use.

Diskette-eject button
Press this button to release a diskette from the diskette drive.

Diskette drive activity LED
When this LED is lit, it indicates that the diskette drive is in use.

Hard disk drive activity LED
When this LED is flashing, it indicates that a hard disk drive is in use.

Power-on LED
When this LED is lit and does not flash, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is off and still connected to an ac power source.

Power-control button
Press this button to turn the server on and off manually. You can install a circular disk, called the power-control button shield, over the power-control button to prevent accidental manual power-off. This disk is provided with your server.

System error LED
When this LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in Chapter 6, “Symptom-to-FRU index”, on page 97.

Ethernet transmit/receive activity LED
This LED is on the Ethernet connector on the back of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED

This LED is on the Ethernet connector on the back of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Chapter 2. Configuring your server

The following configuration programs are provided with your server:

- **Configuration/Setup Utility**

  This is part of the basic input/output system (BIOS) code in your server. Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this utility program, see "Using the Configuration/Setup Utility program".

- **IBM *ServerGuide Setup and Installation* CD**

  This provides software-setup tools and installation tools that are designed for your server. Use this CD during the installation of your server to configure basic hardware features, such as an integrated SCSI controller with RAID capabilities, and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 11.

- **ServeRAID Manager**

  ServeRAID Manager is available as a stand-alone program and as an IBM Director extension. If a ServeRAID adapter is installed in your server or if you are using the RAID capabilities of the SCSI controller, use ServeRAID Manager to define and configure your disk-array subsystem *before* you install the operating system. For information about using this program, see "Using ServeRAID Manager" on page 15.

- **LSI Logic Configuration Utility**

  Use this to configure the integrated SCSI controller with RAID capabilities and the devices that are attached to it. For information about using this utility program, see "Using the LSI Logic Configuration Utility program" on page 15.

- **Ethernet controller configuration process**

  For information about configuring the Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 16.

Using the Configuration/Setup Utility program

Use the Configuration/Setup Utility program to:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords and Remote Control Security settings
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View and clear error logs

Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility

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menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.

3. Select settings to view or change.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS code in your server, some menu choices might differ slightly from these descriptions.

- **System Summary**

  Select this choice to view configuration information, including the type, speed, and cache sizes of the microprocessors and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  This choice is on the full and limited Configuration/Setup Utility menu.

- **System Information**

  Select this choice to view information about your server. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Configuration/Setup Utility menu only.

  – **Product Data**

    Select this choice to view the machine type and model of your server, the serial number, and the revision level or issue date of the BIOS and diagnostics code stored in electrically erasable programmable ROM (EEPROM).

  – **System Card Data**

    Select this choice to view information about the system board.

- **Devices and I/O Ports**

  Select this choice to view or change assignments for devices and input/output (I/O) ports.

  Select this choice to enable or disable integrated SCSI and Ethernet controllers and all standard ports (such as serial and parallel). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the integrated SCSI controller and no SCSI adapter is installed, the server will have no SCSI capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability.

  This choice is on the full Configuration/Setup Utility menu only.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

- **System Security**

  Select this choice to set passwords. See “Passwords” on page 10 for more information about passwords. You can also enable the chassis-intrusion detector to alert you each time the server cover is removed.

  – **Power-on Password**

    Select this choice to set or change a power-on password. See “Power-on password” on page 11 for more information.

  – **Administrator Password**

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. See “Administrator password” on page 11 for more information.

- **Start Options**

  Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

  You can set keyboard operating characteristics, such as the keyboard speed, and you can specify whether the server starts with the keyboard number lock on or off. You can enable the server to run without a diskette drive, monitor, or keyboard.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If your server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. You can also specify whether the integrated SCSI controller or a PCI SCSI adapter has boot precedence.

  If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

  You can enable a virus-detection test that checks for changes in the boot record when the server starts.

- **Advanced Setup**

  Select this choice to change settings for advanced hardware features.

  Important: The server might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

  – **Power Management Setup**

    Select this choice to enable or disable system power settings. This includes automatic power-on settings such as the Wake on LAN® feature.

  – **Chipset Feature**

    Select this choice to modify settings that control features of the core chip set on the system board.

    Attention: Do not make changes in the Chipset Feature option unless directed to do so by an IBM authorized service representative.

  – **Processor Control**

    Select this choice to enable or disable the microprocessor cache and hyper-threading.

    Attention: Do not make changes in the Processor Control option unless directed to do so by an IBM authorized service representative.

- **PC Health Status**

  Select this choice to display the server temperature, voltage status, and fan speeds.
- **Error Logs**

  Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.

  Select **Clear event/error logs** from the **POST Error Log** menu to clear the POST Error Log.
- **Save Settings**

  Select this choice to save the changes you have made in the settings.
- **Restore Settings**

  Select this choice to cancel the changes you have made in the settings and restore the previous settings.
- **Load Default Settings**

  Select this choice to cancel the changes you have made in the settings and restore the factory settings.
- **Exit Setup**

  Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **System Security** choice, you can set, change, and delete a power-on password and an administrator password. The **System Security** choice is on the full Configuration/Setup menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup, and you have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If you have forgotten the user password and an administrator password is set, type the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the user password.

  CAUTION:
  Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
- Clear CMOS settings by changing the position of the CMOS recovery jumper (JBAT1). See “Erasing a lost or forgotten password (clearing CMOS)” on page 28 for instructions.
- Remove the battery and then install the battery. See the *Option Installation Guide* on the IBM *xSeries Documentation* CD for instructions.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Configuration/Setup Utility menu. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD includes an easy-to-use setup and installation program that is specifically designed for your IBM server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating system installations by providing updated device drivers and, in some cases, installing them automatically.

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the image, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/coupon/.

The ServerGuide program has the following features to make setup easier:

- An easy-to-use interface with online help
- Diskette-free setup, and configuration programs that are based on detected hardware
- Performance Optimizer program, which easily tunes your SCSI RAID adapter settings for your server environment
- A system BIOS update program, which updates the BIOS code directly from the CD
- Device drivers that are provided for your server model and detected hardware
- Operating system partition size and file-system type that are selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD-ROM drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating system CD to install your operating system.

The ServerGuide program has the following features:

- Sets system date and time.
- Detects an installed SCSI RAID adapter or controller and runs the SCSI RAID configuration program. (Does not apply to the integrated SCSI controller with RAID capabilities.)
- Updates the licensed internal code (firmware) level without diskettes.
- Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without using diskettes.
- Provides the Performance Optimizer program to easily tune your SCSI RAID adapter settings for your server environment.
- Creates a System Partition on the default drive. You can run server-specific utility programs after setup.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Creates a setup-replication diskette for replicating setup selections for other servers of the same model.
- Provides diskette-free installation for supported operating systems.
- Provides a replicated installation path for multiple installations of supported operating systems.
- Includes an online README file with links to tips for your hardware and operating system installation.

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The ServerGuide program checks your system BIOS, service processors, and other system hardware to determine if system updates are available. The setup program provides a list of tasks that are required to set up your server model. On SCSI RAID servers, you can run the SCSI RAID configuration program to create logical drives.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

When you start the *ServerGuide Setup and Installation* CD, the program performs the following tasks:

- The ServerGuide program prompts you for your language, country, and keyboard layout. (This information is stored and later passed to the operating system installation program.)
- The ServerGuide program displays choices for running the configuration programs. For example:

  - The Express Configuration method runs the required programs for your server, based on the hardware that is detected.
  - The Custom Configuration method displays all programs that are available for your server, and you decide which programs to run.
  - The Replicated Configuration method provides the option of duplicating your setup selections to other servers that are the same model.
- If you select the Custom Configuration method, the following features are optional. If you select the Express Configuration method, some or all of these features are run, depending on the hardware that is detected:
  - The Set Date and Time feature is provided so that you do not have to use the Configuration/Setup Utility program to access these settings.
  - The Clear Hard Disks feature is provided so you can delete all partitions on all hard disk drives. If the server has a SCSI RAID adapter installed, you can select to restore the configuration on the SCSI RAID adapter to the factory default settings.
  - The ServerGuide program checks the server BIOS code and microcode (firmware) levels for supported options and then checks the CD for a newer level. The CD content might be newer than the BIOS code and firmware level. The ServerGuide program can perform a flash update of the BIOS code and supported microcode (firmware) options without using diskettes.
  - The SCSI RAID configuration program starts, leading you through the entire configuration process.
  - The Performance Optimizer program easily tunes your server for your environment.
  - The ServerGuide program creates a System Partition on the default drive.
- The ServerGuide program displays a confirmation summary, so that you will know when you have completed all the required tasks. Then, you are ready to install your operating system.

Notes:

1. Plug and Play adapters are configured automatically. Non-Plug and Play adapters or non-IBM adapters might require switch settings, additional device drivers, and installation after the operating system is installed. See the documentation that comes with the adapter.
2. Diagnostics for your server come in BIOS code or on a separate diagnostics CD.

System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as service processor disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs. Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *ServerGuide Setup and Installation* CD and view the online overview.

After setup is complete, you can access programs in the System Partition by restarting the server and pressing Alt+F1 when the prompt is displayed. The **System Partition** menu displays the programs that are available on your server model.

Typical operating system installation

You can use the ServerGuide program to shorten your installation time. The ServerGuide program provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating system installation program starts. (You will need your operating system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating system installation program.
3. With some operating system installations, you can create an operating system replication diskette for setting up additional servers. This diskette contains the Internet protocol (IP) address, server name, and other selections.
4. The ServerGuide program presents operating system partition options that are based on your operating system selection and the installed hard disk drives.
5. If you are installing the operating system from diskette, the ServerGuide program lists the diskettes that you must create and the optional diskettes that you might want to create. The diskettes that you can create are the device-driver diskettes for the installed adapters or controllers.
6. The ServerGuide program prompts you to insert your operating system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

Setting up or updating multiple servers

You can use the ServerGuide program to create diskettes that help you set up or update multiple servers. You can modify information on the diskettes as you use them to set up or update other servers.

Note: Availability and function can vary by server model and by the hardware that is installed.

You can create a setup-replication diskette, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create an operating system replication diskette, which contains information that you need to complete multiple installations. Not all operating systems support operating system replication diskettes.

Installing your operating system without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install your operating system, complete the following steps to download the latest operating system installation instructions from the IBM Support Web page:

1. Go to http://www.ibm.com/pc/support/.
2. Under **Browse**, click **Servers**.

3. From the **Family** drop-down list, select your server model.
4. If operating system installation instructions are available for your server model, **OS installation** is in the list in the upper-left corner of the Web page. Click **OS installation** and select the instructions for your operating system.

Using ServeRAID Manager

You can use the ServeRAID™ Manager program, which is on the *IBM ServeRAID Support* CD, to:

- Configure a redundant array of independent disks (RAID)
- Restore a SCSI hard disk drive to factory-default settings, erasing all data from the disk
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers

You can run ServeRAID Manager in startable-CD mode from the *IBM ServeRAID Support* CD or as an installed program. For information about installing ServeRAID Manager, see the documentation on the CD.

See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager. The *Installation Guide* for your server also contains instructions for using ServeRAID Manager to configure your integrated SCSI controller with RAID capabilities.

Notes:

1. The integrated SCSI controller with RAID capabilities in your server supports only RAID level 1. Installing an optional ServeRAID-5i controller provides additional RAID levels.
2. If you install a different type of RAID adapter in your server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

Before you install your operating system, you must configure the controller that is attached to the hard disk drives. Use the configuration program on the *IBM ServeRAID Support* CD to configure the integrated SCSI controller with RAID capabilities or to configure an optional IBM ServeRAID controller.

Notes:

1. You cannot use the *ServerGuide Setup and Installation* CD to configure the optional controllers.
2. To update the firmware and BIOS code for an optional ServeRAID controller, you must use the *IBM ServeRAID Support* CD that comes with the ServeRAID option.

Using the LSI Logic Configuration Utility program

LSI Logic Configuration is a built-in, menu-driven configuration utility program that you can use to:

- Perform a low-level format of a SCSI hard disk drive
- Set a SCSI device scan order
- View or change SCSI IDs for attached devices
- Set SCSI protocol parameters on SCSI hard disk drives

Notes:

1. The integrated SCSI controller with RAID capabilities in your server supports redundant array of independent disks (RAID). You can use the LSI Logic Configuration Utility program to configure RAID level 1 for a single pair of attached devices.
2. If you install a different type of RAID adapter in your server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

The following sections provide the instructions for starting and running the LSI Logic Configuration Utility program and performing selected functions.

Starting the LSI Logic Configuration Utility program

Complete the following steps to start the LSI Logic Configuration Utility program:

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><C> to start LSI Logic Configuration Utility >>>` appears, press Ctrl+C. If you have set an administrator password you are prompted to type the password.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. The **Device Properties** and **Mirroring Properties** choices produce additional screens of parameters to review or change.

Formatting a SCSI hard disk drive

Low-level formatting removes all data from the hard disk. If there is data you want to save, back up the hard disk before performing this procedure. Complete the following steps to format a drive.

Note: Before you format a SCSI hard disk, make sure that it is not part of a mirrored pair. From the list of adapters, select the controller (channel) for the drive to format. Select **Mirroring Properties** and make sure the mirroring value for the drive is set to **None**.

1. From the list of adapters, select the controller (channel) for the drive to format.
2. Select **Device Properties**.
3. Use the arrow keys (↑ or ↓) to highlight the drive to format.
4. Use the arrow keys (← or →) or the End key to scroll to the right.
5. Select **Format**; then, press Enter to begin the low-level formatting operation.

Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1000-Mbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the controller detects the data-transfer rate of the network (10BASE-T, 100BASE-TX, or 1000BASE-T) and automatically operates at that rate, in full-duplex or half-duplex mode, as appropriate. The Ethernet controller supports optional modes, such as teaming, priority packets, load balancing, fault tolerance, and virtual LANs, which provide better performance, security, and throughput. These modes apply to the integrated Ethernet controller and to controllers on supported Ethernet adapters.

You do not need to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. The device drivers are available on the *Broadcom NetXtreme Gigabit Ethernet Software CD*. For the latest device drivers and information about configuring your Ethernet controller, go to the IBM Support Web site at http://www.ibm.com/pc/support.

Chapter 3. Diagnostics

This section provides basic troubleshooting information to help you resolve some common problems that might occur with your server.

If you cannot locate and correct the problem using the information in this section, see Appendix A, “Getting help and technical assistance”, on page 123 for more information.

General checkout

The server diagnostic programs are stored on the IBM *Enhanced Diagnostics CD*. These programs provide the primary methods of testing the major components of the server.

If you cannot determine whether a problem is caused by the hardware or by the software, you can run the diagnostic programs to confirm that the hardware is working properly.

When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages might not occur the next time you run the test.

A failed server might be part of a shared DASD cluster (two or more servers sharing one or more external storage devices). Before you run diagnostics, verify that the failing server is not part of a shared DASD cluster.

A server might be part of a cluster if:

- The server is identified as part of a cluster.
- One or more external storage units are attached to the server and at least one of the attached storage units is also attached to another server or unidentifiable source.
- One or more servers are located near the failing server.

If the failing server is suspected to be part of a shared DASD cluster, you can run all diagnostic tests except the diagnostic tests that test the storage unit (DASD residing in the storage unit) or the storage adapter attached to the storage unit.

Notes:

1. For servers that are part of a shared DASD cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the DASD diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code that is displayed.
3. If the server stops with a POST error, go to “POST error codes” on page 106.
4. If the server stops and no error is displayed, go to “Undetermined problems” on page 113.
5. For power supply problems, see “Power checkout” on page 29.
6. For safety information, see “Safety information” on page 125.
7. For intermittent problems, check the error log.

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Checkout procedure

Follow the steps in this procedure to identify system problems.

001 **IS THE SERVER PART OF A CLUSTER?**

YES. Schedule maintenance for the system. Shut down all systems related to the cluster. Run the storage test.

NO. Go to step **002** .

002 **IF THE SERVER IS NOT PART OF A CLUSTER:**

1. Turn off the server and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Turn on all external devices.
5. Turn on the server.
6. Record any POST error messages that are displayed on the screen. If an error is displayed, look up the first error in the “POST error codes” on page 106.
7. Check the System Error log. If an error was recorded by the server, see Chapter 6, “Symptom-to-FRU index”, on page 97.
8. Start the diagnostic programs.
9. Check for the following responses:
   - One beep.
   - Readable instructions or the main menu.

003 **DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?**

NO. Find the failure symptom in Chapter 6, “Symptom-to-FRU index”, on page 97.

YES. Run the diagnostic programs. If necessary, see “Diagnostic programs, error codes, and messages” on page 22.

If you receive an error, see Chapter 6, “Symptom-to-FRU index”, on page 97.

If the diagnostic programs were completed successfully and you still suspect a problem, see “Undetermined problems” on page 113.

Diagnostic tools overview

The following tools are available to help you identify and resolve hardware-related problems:

- **POST beep codes and error messages**

  The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST error codes and messages” on page 21 for more information.

- **Error logs**

  The POST error log contains the three most recent error codes and messages that the server has generated during POST.

  The System Error Log contains all the error messages that were issued during POST.

  To view the contents of the error logs, start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See “Viewing the System Error log” on page 25 for more information.

- **ServerGuide error symptoms**

  ServerGuide error symptoms are explained at “ServerGuide error symptoms” on page 22.
- **Diagnostic programs and error messages**

  The server diagnostic programs are stored on the IBM *Enhanced Diagnostics CD*. These programs are the primary method of testing the major components of your server. See “Diagnostic programs, error codes, and messages” on page 22 for more information.
- **Customized support page**

  You can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable files. In addition, you can choose to receive electronic mail (e-mail) notifications whenever new information becomes available about your registered products.

  After you register and profile your xSeries products, you can diagnose problems using the IBM Online Assistant, and you can participate in the IBM discussion forum. For more detailed information about registering and creating a customized profile for your IBM products, go to the following addresses on the Web:
  – http://www.ibm.com/pc/register
  – http://www.ibm.com/pc/support

POST error codes and messages

When you turn on the server, it performs a series of tests to check the operation of server components and some of the options installed in the server. This series of tests is called the power-on self-test, or POST.

If POST finishes without detecting any problems, a single beep sounds, and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, and/or an error message appears on your screen. See “Beep symptoms” on page 97 and “POST error codes” on page 106 for more information.

Note: A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.

Error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST.

The System Error log contains all messages issued during POST and all system status messages from the service processor.

You can view the contents of the System Error log from the Configuration/Setup Utility program or from the diagnostic programs.

Viewing error logs from the Configuration/Setup Utility program

Start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See Chapter 2, “Configuring your server”, on page 7 for more information.

Viewing error logs from diagnostic programs

To view error logs from the diagnostic programs, complete the following steps:

1. Start the diagnostic programs. See “Starting the diagnostic programs” on page 24 for more information.
2. Select **Hardware Info** from the top of the diagnostic programs screen.
3. Select **System Error Log** from the list that appears; then, follow the instructions on the screen.

ServerGuide error symptoms

Look for the symptom in the left column of the chart. Probable solutions to the problem are in the right column.

Table 2. ServerGuide Setup and Installation CD

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Ensure that the server is supported and has a startable (bootable) CD-ROM drive. • If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence. • If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.
The SCSI RAID program cannot view all installed drives, or the NOS cannot be installed.	• Ensure that there are no duplicate SCSI IDs or IRQ assignments. • Ensure that the hard disk drive is connected properly.
The Operating System Installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start your NOS CD.	Ensure that the NOS CD you have is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported NOS versions.
The NOS cannot be installed; the option is not available.	Ensure that the NOS is supported on your server. If the NOS is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program, and ensure that setup is complete.

Small computer system interface messages

If you receive a SCSI error message, see “SCSI error codes” on page 109.

Note: If your server does not have a hard disk drive, ignore any message that indicates that the BIOS is not installed.

Diagnostic programs, error codes, and messages

The server diagnostic programs are stored on the IBM *Enhanced Diagnostics CD*. These programs are the primary method of testing the major components of your server.

Diagnostic error messages indicate that a problem exists. They are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel.

Sometimes the first error to occur causes additional errors. In this case, the server displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

Chapter 6, “Symptom-to-FRU index”, on page 97 contains the error codes that might appear in the detailed test log and summary log when the diagnostic programs are run.

The error code format is as follows:

```
fff-ttt-iii-date-cc-text message
```

where:

fff is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

ttt is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel; see “Diagnostic error codes” on page 99).

iii is the three-digit device ID. (These codes are for trained service personnel; see “Diagnostic error codes” on page 99).

date is the date that the diagnostic test was run and the error recorded.

cc is the check value that is used to verify the validity of the information.

text message is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

```
Function Name: Result (test specific string)
```

where:

Function Name
is the name of the function being tested when the error occurred. This corresponds to the function code (fff) shown in the error code format in the previous section.

Result
can be one of the following:

Passed	This result occurs when the diagnostic test is completed without any errors.
Failed	This result occurs when the diagnostic test discovers an error.
User Aborted	This result occurs when you stop the diagnostic test before it is complete.
Not Applicable	This result occurs when you specify a diagnostic test for a device that is not present.
Aborted	This result occurs when the test could not proceed, for example, because of the system configuration.
Warning	This result occurs when a possible problem is reported during the diagnostic test, such as when a device driver is not found.

test specific string
is additional information that you can use to analyze the problem.

Starting the diagnostic programs

Complete the following steps to start the diagnostic programs:

1. Turn on the server and watch the screen.

   Note: To run the diagnostic programs, you must start the server with the highest level password that is set. That is, if an administrator password is set, you must enter the administrator password, not the user password, to run the diagnostic programs.
2. When the message `F2 for Diagnostics` appears, press F2.
3. Type the appropriate password; then, press Enter.
4. Select either **Extended** or **Basic** from the top of the screen.
5. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

Notes:

a. You can press F1 while running the diagnostic programs to obtain help information. You also can press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit from the help information and return to where you left off, press Esc.

b. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

c. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

d. If you run the diagnostic programs with either no mouse or a USB mouse attached to your server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.

e. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB interface test only if there are no USB devices attached.

f. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the diagnostic programs do not detect any hardware errors but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with the software package.

Viewing the test log

When the tests are completed, you can view the test log by selecting **Utility** from the top of the screen and then selecting **View Test Log**.

Notes:

1. You can view the test log only while you are in the diagnostic programs. When you exit the diagnostic programs, the test log is cleared (saved test logs are not affected). To save the test log so that you can view it later, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.
2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette may contain other data.

Viewing the System Error log

You can also view the System Error log from the diagnostic programs. See the instructions in “Viewing error logs from diagnostic programs” on page 22.

System-board error LEDs

The following illustration shows the location of the error LEDs on the system board. You might need to refer to this illustration when solving problems with the server.

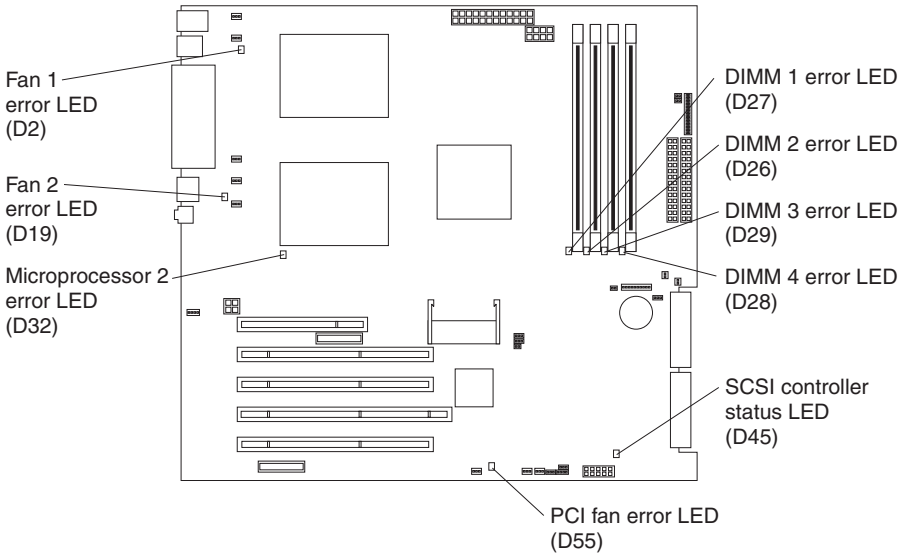


Table 3. Error LEDs

Error LED	Without optional Remote Supervisor Adapter	With optional Remote Supervisor Adapter
DIMM error (D26, D27, D28, D29)	Memory problem (also turns on system error LED on the front bezel)	Memory problem (also turns on system error LED on the front bezel)
Microprocessor 2 error (D32)	Microprocessor 2 problem (also turns on system error LED on the front bezel)	Microprocessor 2 problem (also turns on system error LED on the front bezel)
Fan error (D2, D19, D55)	No function	Fan failure
Hard disk error (LEDs on hot-swap hard disk drives)	Hot-swap hard disk drive failure	Hot-swap hard disk drive failure

Diagnostic error code tables

For descriptions of the error codes that might appear when you run the diagnostic programs, see “Diagnostic error codes” on page 99.

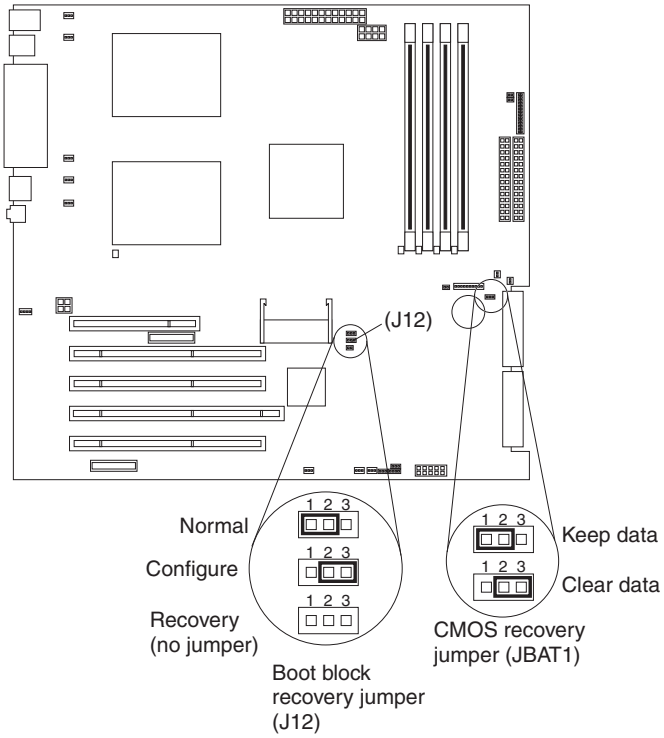
Notes:

1. Depending on your server configuration, some of the error codes might not appear when you run the diagnostic programs.
2. If diagnostic error codes appear that are not listed in the tables, make sure that your server has the latest levels of BIOS, Remote Supervisor Adapter, ServeRAID, and diagnostics microcode installed.

Recovering from a POST/BIOS update failure

If power to your server is interrupted while POST/BIOS code is being updated (flash update), your server might not restart (reboot) correctly. If this happens, use the following procedure to recover:

1. Review “Safety information” on page 125.
2. Turn off the server and all attached devices.
3. Unplug the power cord; then, disconnect all external cables.
4. Remove the side cover and frame-support bracket. (See “Removing the side cover” on page 39 and “Removing the frame-support bracket” on page 40.)
5. Locate the boot block recovery jumper (J12) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the jumper on the system board.



6. Remove the boot block recovery jumper from pins 1 and 2.
7. Replace any adapters that were removed; then, replace the frame-support bracket and replace the side cover. (See “Removing the frame-support bracket” on page 40 and “Installing the side cover” on page 67.)
8. Connect the server to a power source, keyboard, monitor, and mouse.
9. Insert the POST/BIOS update (flash) diskette into the diskette drive. You can download a file to create this diskette from http://www.ibm.com/pc/support on the World Wide Web. For more information, see Appendix A, “Getting help and technical assistance”, on page 123.
10. Turn on the server and the monitor.
11. After the update session completes, turn off the server and monitor.
12. Remove the diskette from the diskette drive.
13. Disconnect all power cords and external cables; then, remove the side cover.
14. Return the boot block recovery jumper to pins 1 and 2.

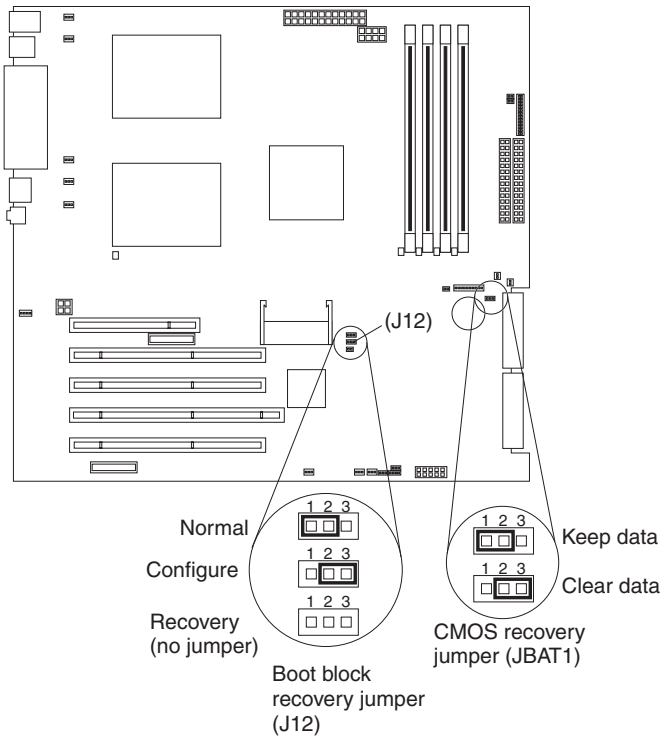
15. Reinstall the side cover; then, reconnect all external cables and power cords and turn on the peripheral devices.
16. Turn on the server to restart the operating system.

Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, see “Passwords” on page 10.

Complete the following steps to set the CMOS recovery jumper and erase a forgotten password:

1. Review the safety information beginning on page 125.
2. Turn off the server and all attached devices.
3. Unplug the power cord, and disconnect all external cables.
4. Remove the side cover and support bracket. (See “Removing the side cover” on page 39 and “Removing the frame-support bracket” on page 40.)
5. Locate the CMOS recovery jumper (JBAT1) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the jumper on the system board.



6. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.
7. Wait 60 seconds; then, return the CMOS recovery jumper to pins 1 and 2.
8. Replace any adapters that were removed; then, replace the frame-support bracket and replace the side cover. (See “Removing the frame-support bracket” on page 40 and “Installing the side cover” on page 67.)

   You can now start the server one time without having to use the power-on password and start the Configuration/Setup Utility program. At this time, you can either delete the old password or set a new power-on password. If you do not change or delete the password, the next time you start the server the original power-on password will be reinstated.

9. Connect the server to a power source, keyboard, monitor, and mouse.
10. Turn on the server. The Configuration/Setup Utility program starts.
11. Follow the instructions to erase the existing password or create a new password.
12. Select **Save Settings** and press Enter.

Power checkout

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Follow this general procedure for troubleshooting power problems:

1. Turn off the server and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits. For example, if there is a loose screw causing a short circuit on a circuit board.
3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until the server is at the minimum configuration required to start the server (see “Minimum operating requirements” on page 105).
4. Reconnect all ac power cords and turn on the server. If the server starts up successfully, replace adapters and devices one at a time until the problem is isolated. If the server does not start up from the minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method, it is important to know the minimum configuration required for a system to start (see page 105).

Troubleshooting the Ethernet controller

This section provides troubleshooting information for problems that might occur with the 10/100/1000 Mbps Ethernet controller.

Network connection problems

If the Ethernet controller cannot connect to the network, check the following conditions:

- Make sure that the cable is installed correctly.

  The network cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

  If you set the Ethernet controller to operate at either 100 Mbps or 1000 Mbps, you must use Category 5 or higher cabling.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.

- Check the Ethernet controller LEDs on the rear of the server.

  These LEDs indicate whether a problem exists with the connector, cable, or hub.
  - The Ethernet transmit/receive activity LED on the rear of the server is lit when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet transmit/receive activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
  - The Ethernet link status LED, on the rear of the server, is lit when the Ethernet controller receives a LINK pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- Make sure that you are using the correct device drivers, which are supplied with your server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.

  The way the Ethernet controller is tested depends on which operating system you are using (see the Ethernet controller device driver README files).

Ethernet controller troubleshooting chart

Use the following troubleshooting chart to find solutions to 10/100/1000 Mbps Ethernet controller problems that have definite symptoms.

Table 4. Ethernet troubleshooting chart

Ethernet controller problem	**FRU/actions**
The server stops running when loading device drivers.	The PCI BIOS interrupt settings are incorrect. Check the following: • Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4, it is recommended that disk controllers not share interrupts with LAN controllers. • Make sure that you are using the most recent device driver available from the World Wide Web. • Reseat or replace the adapter.
Ethernet link status LED does not work.	Check the following: • Make sure that the hub is turned on. • Check all connections at the Ethernet controller and the hub. • Use another port on the hub. • If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. • If you manually configured the Duplex mode, make sure that you also manually configure the speed. • Reseat or replace the adapter.
The Ethernet transmit/receive activity LED does not work.	Check the following: • Make sure that you have loaded the network device drivers. • The network might be idle. Try sending data from this server.
Data is incorrect or sporadic.	Check the following: • Make sure that you are using Category 5 or higher cabling when operating the server at 100 Mbps or at 1000 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Table 4. Ethernet troubleshooting chart (continued)

Ethernet controller problem	FRU/actions
The Ethernet controller stopped working when another adapter was added to the server.	Check the following: • Make sure that the cable is connected to the Ethernet controller. • Make sure that your PCI system BIOS code is current. • Reseat the adapter. • Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the system. Use the Configuration/Setup Utility program to determine if this is the case. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. • Reseat or replace the adapter.
The Ethernet controller stopped working without apparent cause.	Check the following: • Try a different connector on the hub. • Reinstall the device drivers. See your operating-system documentation and the ServerGuide information. • Reseat or replace the adapter.

Ethernet controller messages

The integrated Ethernet controller might display messages from certain device drivers. The latest information available concerning these messages will be made available at the IBM Support Web site at http://www.ibm.com/pc/support.

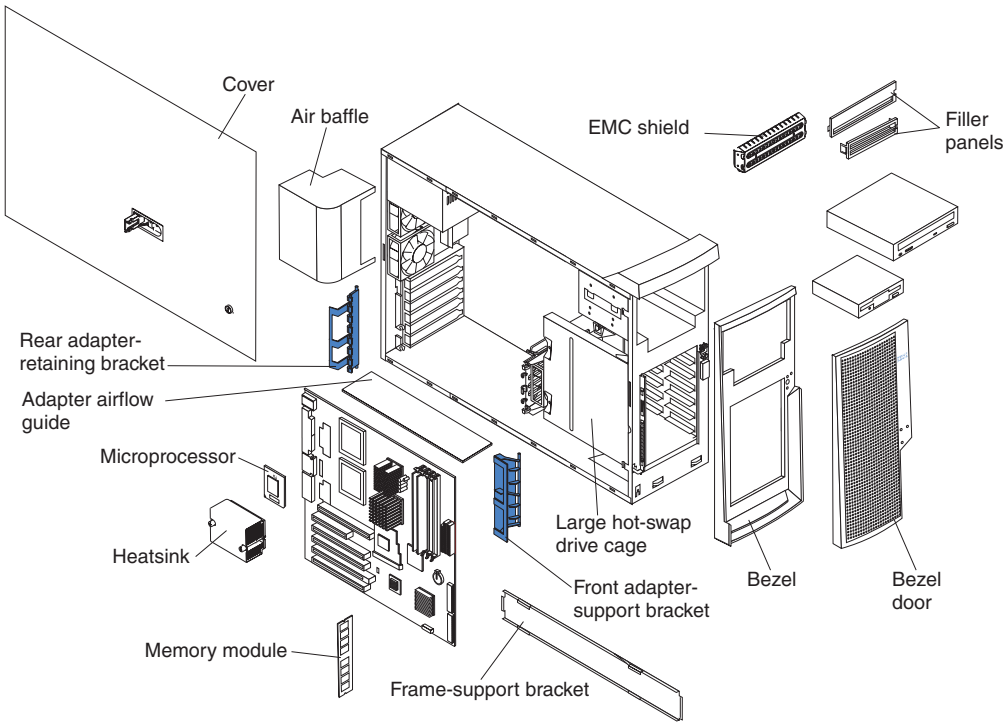
Chapter 4. Installing options

This chapter provides instructions for adding hardware options to your server. Some option-removal instructions are provided in case you need to remove one option to install another.

Major components of the IBM @server xSeries 225 Type 8647

The following illustration shows the locations of major components of the IBM @server xSeries 225 Type 8647 server.

Note: The illustrations in this document might look slightly different from your hardware.



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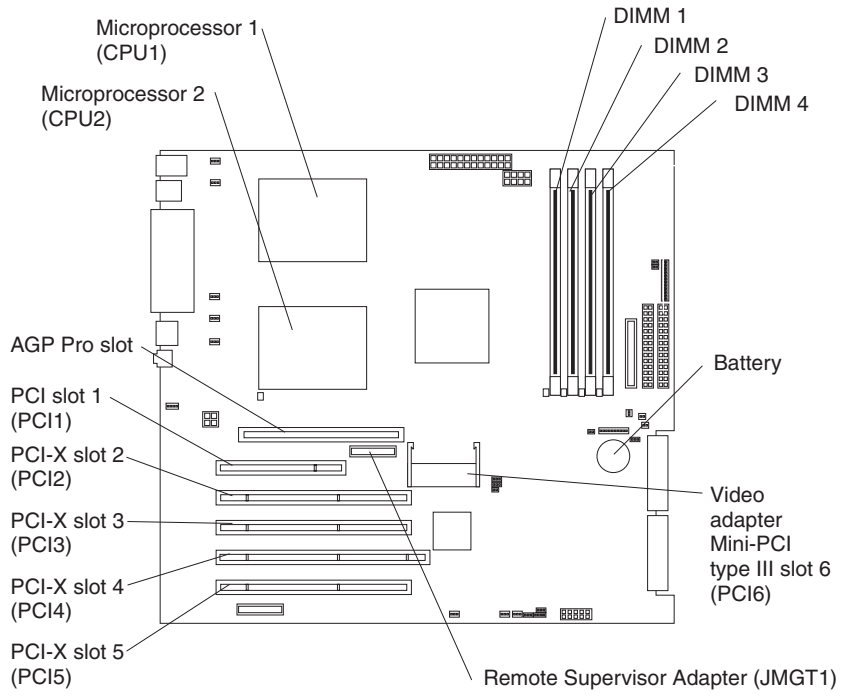
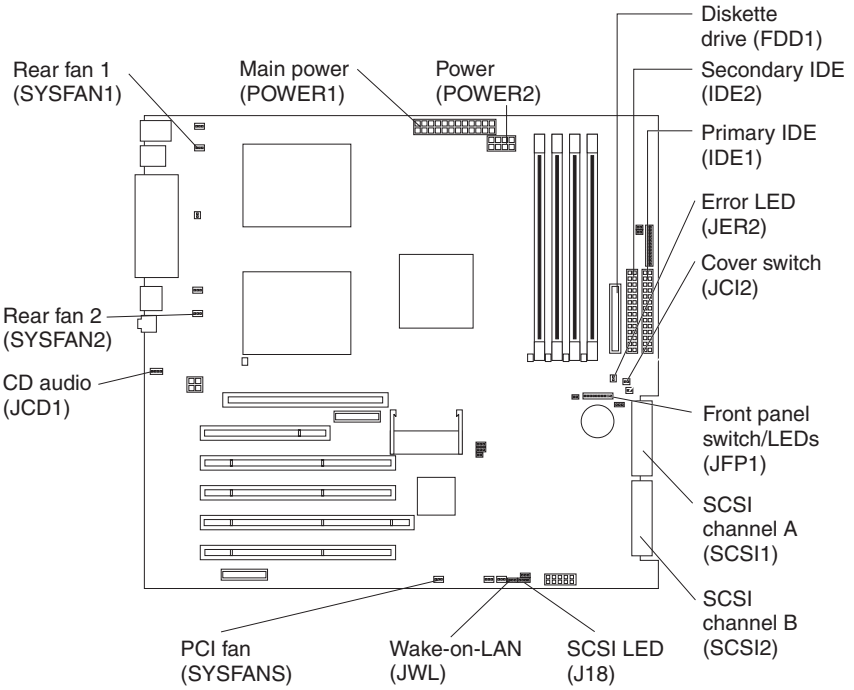
System board

This illustration identifies the parts of the system board. Depending on installed options, your system board might look slightly different.



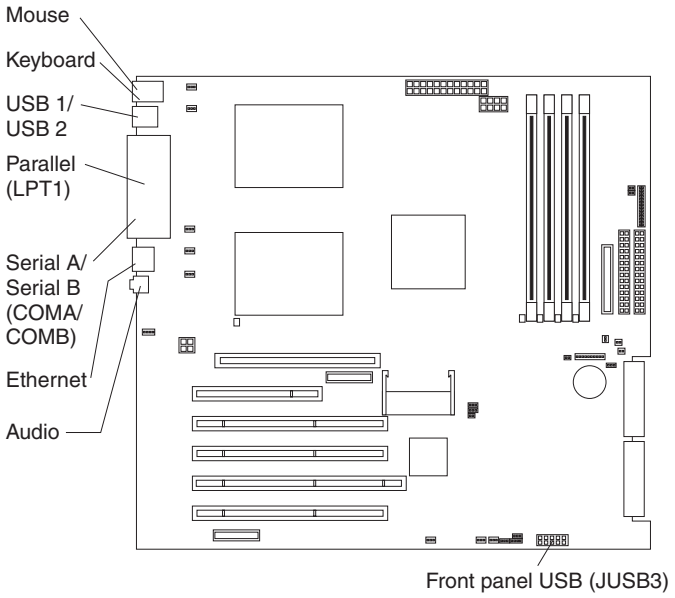
System board internal cable connectors

The following illustration identifies system board connectors for internal cables.



System board external cable connectors

The following illustration identifies system board connectors for external options.



System-board error LEDs

The following illustration shows the LEDs on the system board. You might need to refer to this illustration when solving problems with the server.

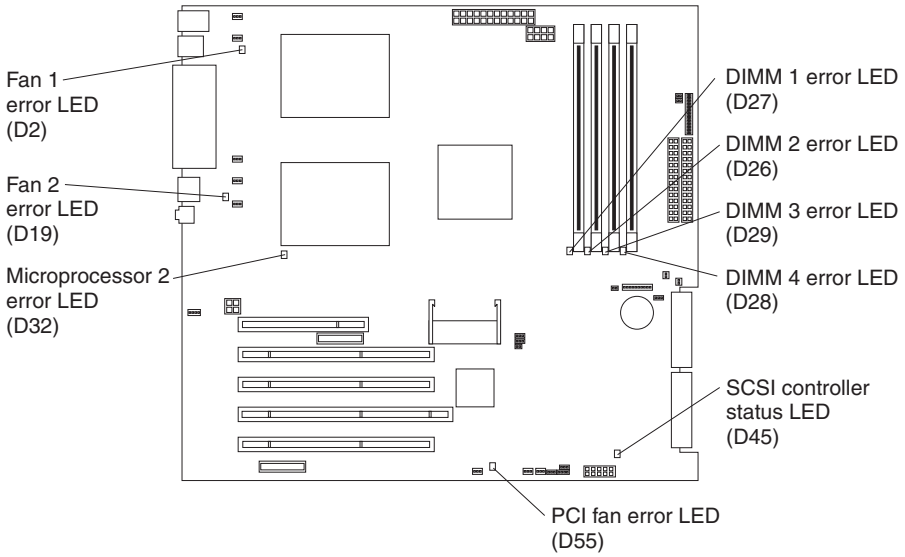


Table 5. Error LEDs

Error LED	Without optional Remote Supervisor Adapter	With optional Remote Supervisor Adapter
DIMM error (D26, D27, D28, D29)	Memory problem (also turns on system error LED on the front bezel)	Memory problem (also turns on system error LED on the front bezel)
Microprocessor 2 error (D32)	Microprocessor 2 problem (also turns on system error LED on the front bezel)	Microprocessor 2 problem (also turns on system error LED on the front bezel)

Table 5. Error LEDs (continued)

Error LED	Without optional Remote Supervisor Adapter	With optional Remote Supervisor Adapter
Fan error (D2, D19, D55)	No function	Fan failure
Hard disk error (LEDs on hot-swap hard disk drives)	Hot-swap hard disk drive failure	Hot-swap hard disk drive failure

Installation guidelines

Before you begin to install options in your server, read the following information:

- Review “Safety information” on page 125. These guidelines will help you work safely with your server and options.
- When you need to access the inside of the server to install options, you might find it easier to lay the server on its side. Before laying the server on its side, rotate the two front stabilizing feet a quarter turn inward toward the server, so that they do not break. Before returning the server to an upright position, rotate the front stabilizing feet a quarter turn outward from the server. See “Moving the stabilizing feet” on page 38 for more information.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and other devices that you will connect to the server.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, or hot-plug Universal Serial Bus (USB) devices.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- For a list of supported options for your server, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web.

System reliability considerations

To help ensure proper system cooling and system reliability, make sure that:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- If the server has redundant power, each of the power-supply bays has a power supply installed.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.

  When installing the server in a rack, make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.
- You have followed the cabling instructions that come with optional adapters.
- You replace a failed fan as soon as possible.
- You replace a hot-swap drive within 2 minutes of removal.
- Cables for optional adapters are routed according to the instructions provided with the adapters.

- You do not remove the air baffle when the server is operating. Operating the server without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to an ac power source but is not turned on.

Turning on the server

Notes:

1. Turn on all external devices, such as the monitor, before turning on the server.
2. The power-on LED on the front of the server is lit when the server is on and while it is powering-up.
3. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button. The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If the server is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be turned on from the Remote Supervisor Adapter user interface.
- If an optional Remote Supervisor Adapter is installed in the server, the server can be turned on from the Remote Supervisor Adapter user interface.
- When you plug in your server for the first time, the Wake on LAN feature can turn on the server. If your server was previously turned on, it must be properly turned off for the Wake on LAN feature to turn on the server.
- If your server was previously turned on, it must be properly turned off for the Wake on LAN feature to turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

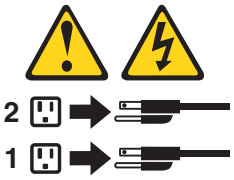
Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5

CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Note: After turning off the server, wait at least 5 seconds before you press the power-control button to turn on the server again.

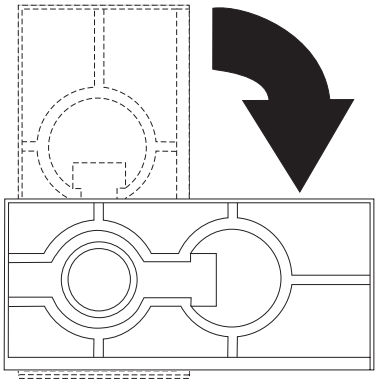
The server can be turned off in any of the following ways:

- You can turn off your server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button on the front of the server to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the server is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be turned off from the Remote Supervisor Adapter user interface.
- Of an optional Remote Supervisor Adapter is installed in the server, the server can be turned off from the Remote Supervisor Adapter user interface.
- The server can turn itself off as an automatic response to a critical system failure.

Moving the stabilizing feet

On some server models, the four feet on the bottom of the server rotate 90 degrees to provide additional stability.

When installing options in the server, you might find it easier to lay the server on its side. If you do so, rotate the feet inward towards the server, so they do not break.

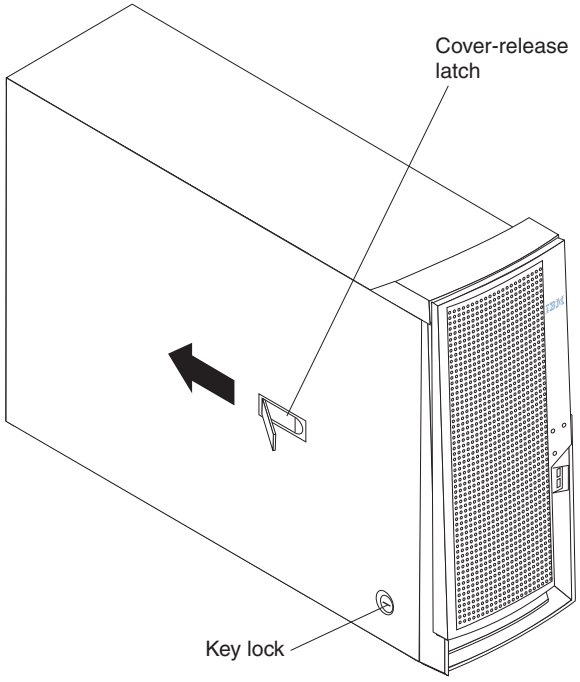


Removing the side cover

To remove the side cover, you might find it easier to lay the server on its side. If you do, and your server has stabilizing feet that rotate, move the stabilizing feet so that they do not break (see “Moving the stabilizing feet” on page 38).

Complete the following steps to remove the side cover of the server:

1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Unlock the side cover; then, pull the cover-release latch away from the server, and push the cover toward the rear of the server. Lift the side cover off the server and set it aside.



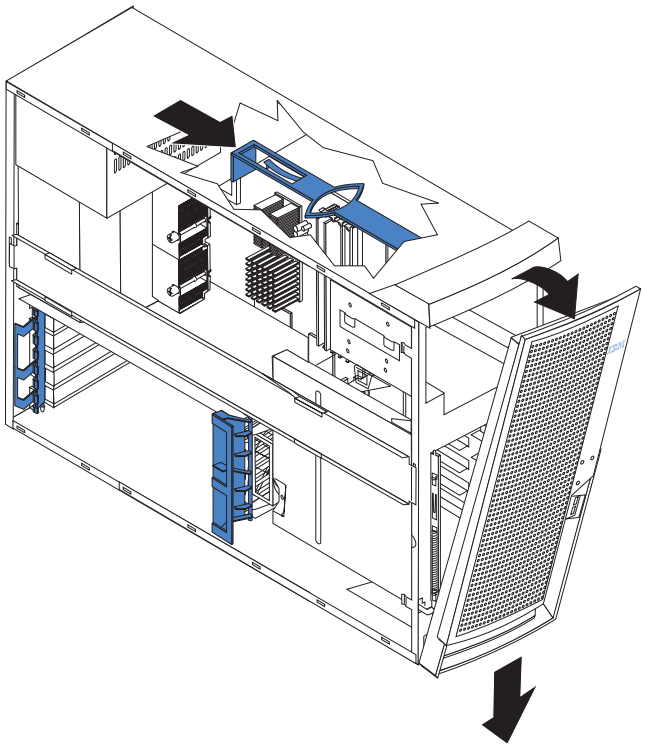
Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server with the cover removed might damage server components.

Removing the front bezel

When working with some devices, such as additional optical drives, you must first remove the front bezel to access the device.

Complete the following steps to remove the front bezel:

1. Remove the side cover (see “Removing the side cover” on page 39).
2. For hot-swap hard disk drive models:
   a. Open the server door.
   b. Rotate the hot-swap lock bar forward and remove it from the bezel (see the illustration on page 48). If the hot-swap lock bar will not rotate, press the top of the hot-swap lock bar to release the lock mechanism.
3. Locate the bezel-release lever; then, press the bezel-release lever toward the front of the server.
4. Pull the top of the bezel away from the chassis; then, push the bezel down to disengage the bottom tabs.
5. Remove the bezel from the server and store the bezel in a safe place.

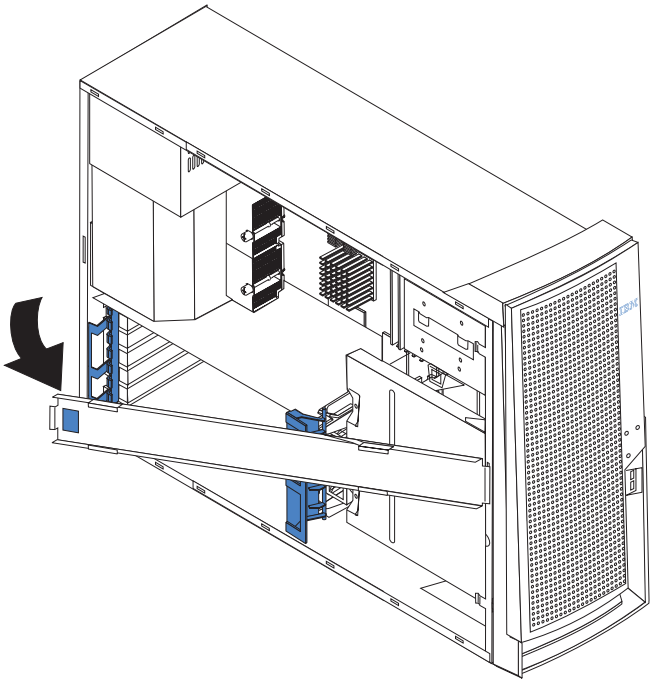


Removing the frame-support bracket

When working with some devices, such as hard disk drives, adapters, and memory modules, you must first remove the frame-support bracket to access the device.

Complete the following steps to remove the frame-support bracket:

1. Review Safety information beginning on page 125 and “Installation guidelines” on page 36.
2. Remove the side cover (“Removing the side cover” on page 39).
3. Pull out on the rear end of the frame-support bracket approximately 150 mm (6 in.).
4. Disengage the front end of the frame-support bracket from the server and set the bracket aside.



To reinstall the frame-support bracket, reverse the previous steps.

Working with adapters

Your server comes with adapter connectors or *slots*. The standard video adapter is installed in mini-PCI slot 6 (PCI6). You can install up to five additional optional adapters in PCI slot 1 (PCI1) and PCI-X slots 2 through 5 (PCI2 through PCI5).

See “System board” on page 34 for the locations of expansion slots on the system board.

Adapter considerations

Before you install an adapter, review the following information:

- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- Installation of an AGP video adapter in the AGP slot is not supported.
- You can install a only 32-bit adapter in the 32-bit PCI slot 1 and 64-bit adapters in the 64-bit PCI-X slots 2 through 5.

- You can install full-length adapters in all five expansion slots; however, double-width adapters will not fit in slot 5 and are not supported. None of the expansion slots are hot-plug.
- The 32-bit PCI slot 1 supports 5.0 V signaling PCI adapters; it does not support 3.3 V signaling adapters or 64-bit adapters.
- The 64-bit PCI-X slots 2 through 5 support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is as follows:
  - The 32-bit PCI slot 1 and mini-PCI slot 6 (video adapter) are on the 33 MHz PCI bus.

    Note: Do not install any adapters other than the standard video adapter in mini-PCI slot 6. Other adapter types are not supported.
  - The 64-bit PCI-X slots 2 and 3 and the integrated Ethernet controller are on the 100 MHz PCI-X bus, channel A.
  - The 64-bit PCI-X slots 4 and 5 and the integrated SCSI controller with RAID capabilities are on the 100 MHz PCI bus, channel B. If an optional ServeRAID-5i controller is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities and forces PCI-X slots 4 and 5 to 66 MHz.
- The optional IBM Remote Supervisor Adapter can be installed only in PCI slot 1. Use the ribbon cable that comes with this adapter to connect it to the Remote Supervisor Adapter connector (JMGT1) on the system board.
- The optional ServeRAID-5i controller can be installed only in PCI-X slot 4 and must use the 3-U bracket that comes preinstalled on the controller.
- To provide failover protection, an optional Ethernet adapter can be installed only in PCI-X slots 2 through 5.
- The server scans the AGP slot, mini-PCI slot 6, PCI expansion slot 1, and PCI-X expansion slots 2 through 5 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: AGP slot, mini-PCI slot 6, PCI expansion slot 1, system-board integrated drive electronics (IDE) or SCSI devices (including optional ServeRAID-5i controller), and then PCI-X expansion slots 2 through 5.
- For a list of supported options for your server, go to http://www.ibm.com/pc/support/ on the World Wide Web.

Installing an adapter

Note: You can install an optional ServeRAID-5i controller only in PCI-X slot 4. Slot 4 is the only PCI-X slot that supports the ServeRAID-5i controller requirements. Install the ServeRAID-5i controller using the 3-U bracket that comes preinstalled on the controller. See the documentation that comes with the ServeRAID-5i controller for additional information.

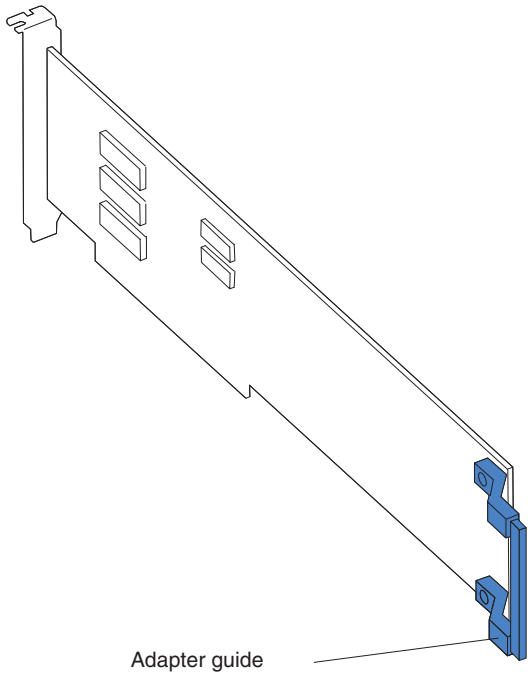
Complete the following steps to install an adapter in your server:

1. Review the “Installation guidelines” on page 36 and “Safety information” on page 125.
2. Remove the side cover (see “Removing the side cover” on page 39).
3. Determine which slot you will use for the adapter. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route cables before you install the adapter.

4. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the server. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
5. Remove the expansion-slot cover. From the rear of the server, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

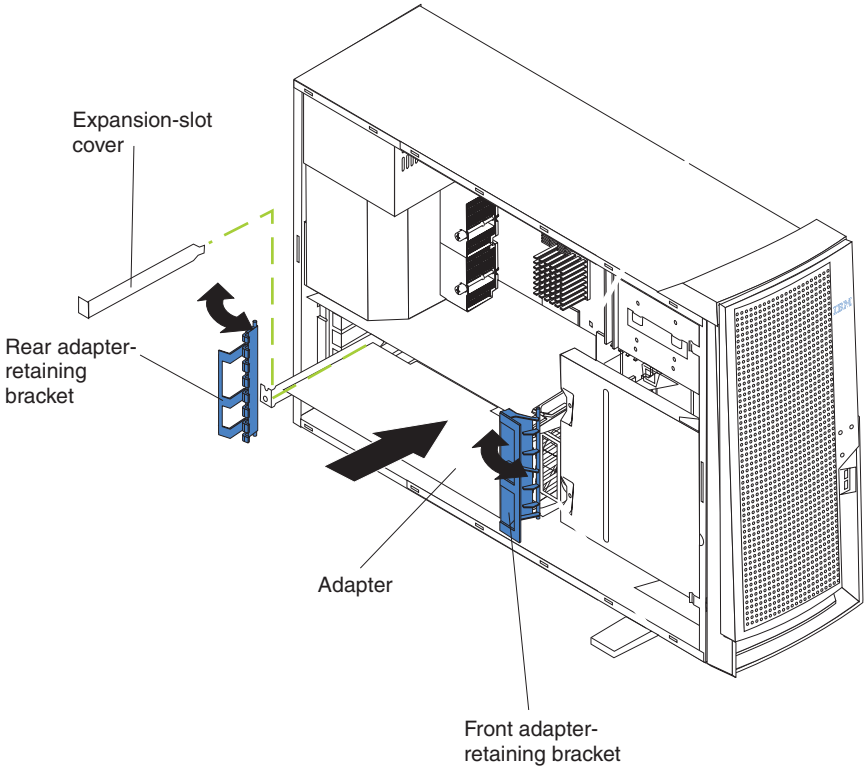
   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
6. Set any jumpers or switches on the adapter or system board according to the documentation that comes with the adapter.

   Attention: Avoid touching the components and gold-edge connectors on the adapter.
7. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.

8. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the adapter slot.



9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see "Cabling an optional SCSI adapter" for additional information.
10. If you have another adapter to install, repeat steps 3 through 9.
11. If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.
12. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

    Note: If any adapters in your server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws. The expansion-slot screws are stored on the back of the server next to slot 1.

13. If you have other options to install, do so now; otherwise, go to "Completing the installation" on page 67.

Cabling an optional SCSI adapter

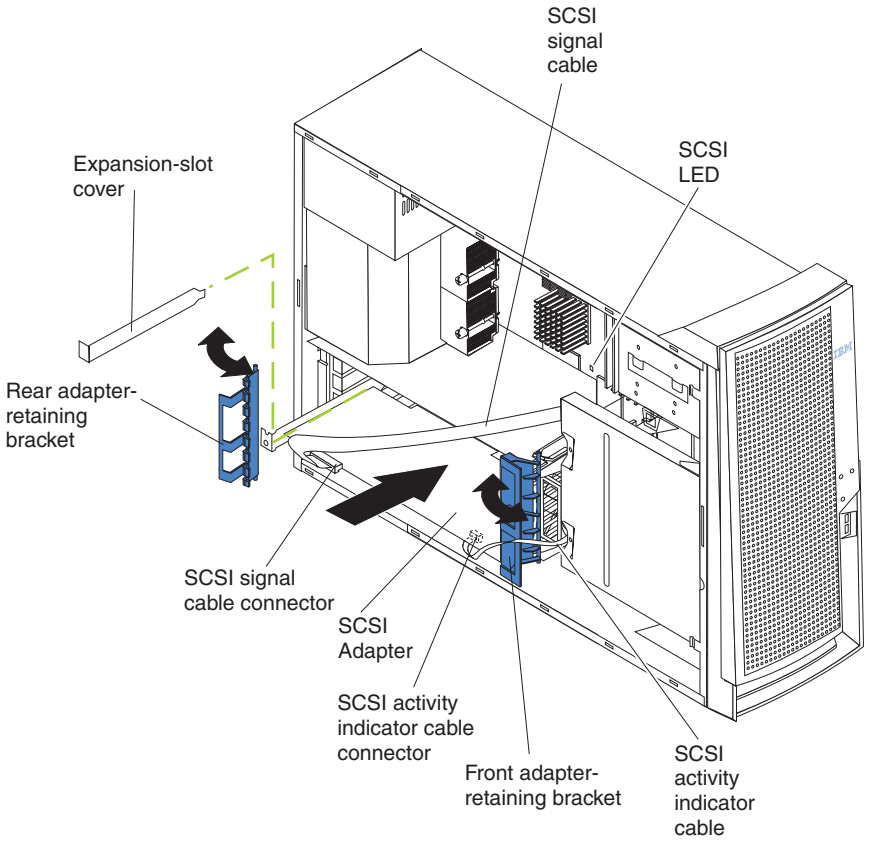
You can install an optional SCSI adapter in your server to control the internal hard disk drives. With a SCSI adapter installed, you can configure the internal hard disk drives into disk arrays. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation for complete instructions for installing a SCSI adapter in your server and for additional information about SCSI adapters.

Notes:

1. This information in this section does not apply to the ServeRAID-5i controller, which uses the integrated SCSI controller with RAID capabilities on the system board.
2. An optional SCSI adapter or cable option is required to connect external SCSI devices.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see “Installing an adapter” on page 42).
2. Connect the SCSI signal cable to the adapter and to one or more of the signal-cable connectors to the rear of the SCSI devices.
3. Connect the SCSI-activity-indicator cable to the adapter and to the SCSI-LED connector (J18) on the system board. See “System board internal cable connectors” on page 34 for the location of the SCSI-LED connector.



4. Complete the installation of the optional SCSI adapter.

Installing internal drives

Several types of drives are available, such as:

- Diskette
- Hard disk
- CD-ROM
- DVD-ROM
- Tape, including digital linear tape (DLT), super digital linear tape (SDLT), and linear tape-open (LTO)

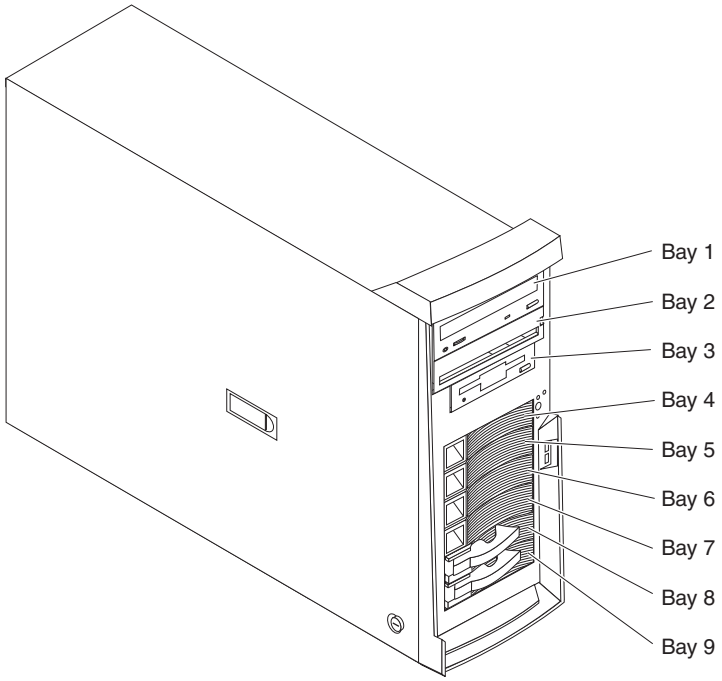
Note: The server supports both internal and external tape drives.

Some server models contain hardware that supports hot-swap drives, which you can replace without turning off the server.

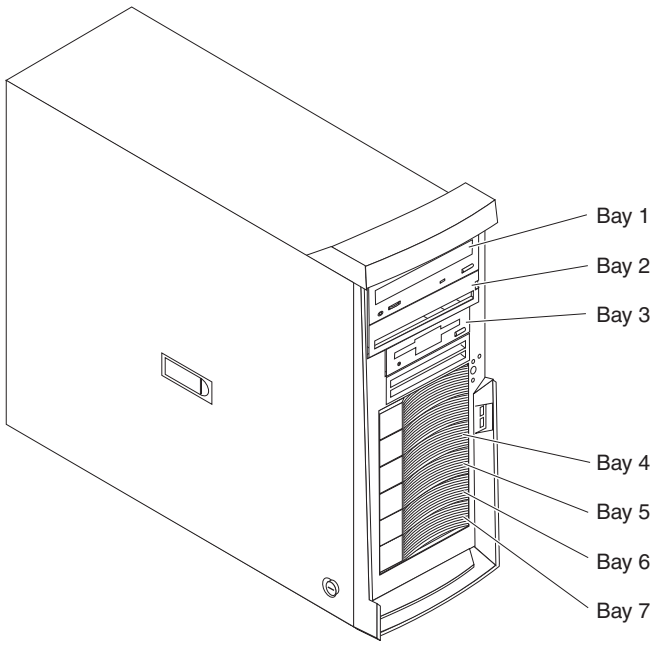
Internal drive bays

All server models come with an IDE CD-ROM drive in bay 1 and a 2.3-in., 1.44 MB diskette drive in bay 3. Depending on your server model it will also come with either six hot-swap hard disk drive bays or a hard disk drive in bay 7. Internal drives are installed in *bays*.

Server with hot-swap hard disk drives



Server with non-hot-swap hard disk drives



Note: The SCSI IDs for the hot-swap drives are printed on the hot-swap lock bar, immediately adjacent to the hot-swap drive bays (see Table 6 on page 50).

A three-drop power signal cable and a one-drop IDE cable come attached to the CD-ROM drive. Use this power signal cable to connect the removable-media drives. The one-drop SCSI signal cable that comes with your server will need to be replaced with a two-drop SCSI signal cable to provide a signal connection to the removable-media drives.

The integrated IDE controller in your server supports the connection of up to four IDE devices.

Some server models support a maximum of six 1-inch (26 mm) slim-high, 3.5-inch, hot-swap hard disk drives in the hot-swap bays. The hot-swap bays are arranged vertically in the hard disk drive cage; the bay numbers are 1 through 6 (from bottom to top). Bays 1 through 6 are below the removable-media drive bays.

Diskette drives, tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.

You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup drive, in bay 2. The server supports half-high DLT, SDLT, and LTO drives. For a list of supported options for your server, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web. To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit, supplied with the option.

The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.

Notes:

1. To minimize the possibility of damage to the hard disk drives when you are installing a hard disk drive in a rack model, install the rack model in the rack before installing the hard disk drives.
2. You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.

Working with hot-swap drives

The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information about drive bays and drive installation, see “Installing internal drives” on page 45. The low voltage differential (LVD) SCSI hot-swap hard disk drive backplane supports a maximum of six slim-high, hot-swap hard disk drives.

Each hot-swap drive that you plan to install must be mounted in a hot-swap-drive tray. The drive must have a Single Connector Attachment (SCA) connector. Hot-swap-drive trays come with hot-swap drives.

Each hot-swap drive has two indicator LEDs (see the *User's Guide* on the IBM *xSeries Documentation* CD). If the amber hard disk drive status LED for a drive is lit

continuously, that drive is faulty and requires replacement. When the hard disk drive status LED indicates a drive fault, you can replace the drive without turning off the server.

For increased security, the hot-swap drives and filler panels are locked in the server by the hot-swap lock bar. The hot-swap lock bar cannot be released, allowing installation and removal of the hot-swap drives and filler panels, unless the key lock on the server side cover is unlocked.

Note: All drives being used in the server should have the same speed rating: mixing speed ratings will cause all drives to operate at the lower speed.

The hard disk drives that are connected to the standard backplane are attached to channel A.

Notes:

1. Table 6 on page 50 lists the SCSI identifiers (IDs) for the standard LVD SCSI backplane and hard disk drives.
2. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors.
3. For additional information about cabling, see “Cabling an optional SCSI adapter” on page 44 and “Connecting external options” on page 69.

Installing a hot-swap hard disk drive

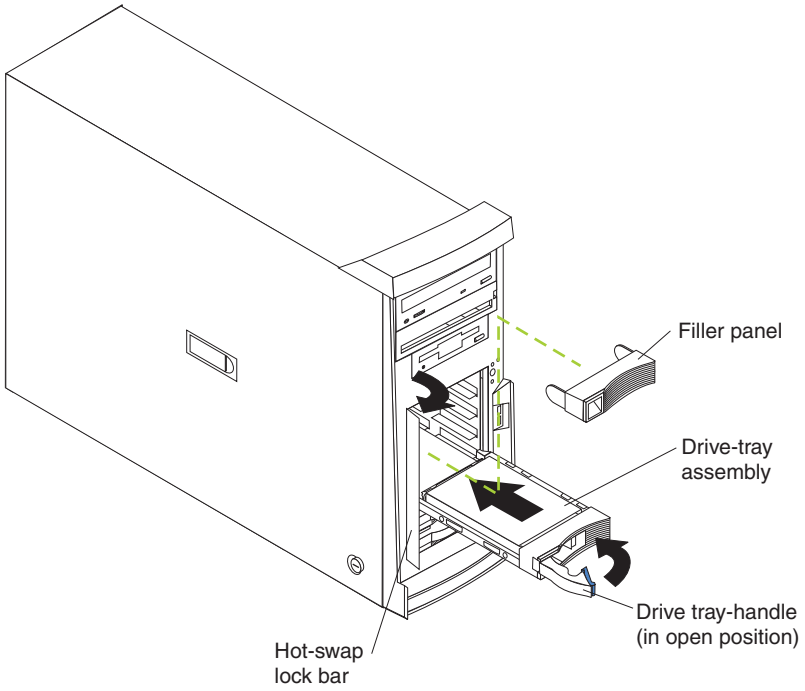
Complete the following steps to install a drive in a hot-swap bay.

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed for each bay.

Note: All hot-swap drives being used in the server should have the same speed rating; mixing speed ratings will cause all drives to operate at the lower speed.

1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Open the server door.
3. Remove the hot-swap lock bar.
   a. Unlock the side-cover lock.
   b. Rotate the hot-swap lock bar forward and remove it from the bezel. If the hot-swap lock bar will not rotate, press the top of the hot-swap lock bar to release the lock mechanism.
4. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.

5. Install the hard disk drive in the hot-swap bay:
   a. Ensure that the tray handle is open (that is, perpendicular to the drive).
   b. Align the drive assembly with the guide rails in the bay.
   c. Gently push the drive assembly into the bay until the drive stops.
   d. Push the tray handle to the closed (locked) position.



   e. Check the hard disk drive status indicator to verify that the hard disk drive is operating properly.

      If the amber hard disk drive status light for a drive is lit continuously, that drive is faulty and needs to be replaced. If the green hard disk drive activity light is flashing, the drive is being accessed.

   Note: If your server is configured for RAID operation using the integrated SCSI controller with RAID capabilities or an optional ServeRAID controller, you might need to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information on RAID operation and complete instructions for using ServeRAID Manager.
6. If you are installing additional hot-swap hard disk drives, do so now; otherwise, continue with step 7
7. Make sure that the side cover is unlocked; then, insert the hot-swap lock bar into the slots on the front bezel and rotate it to the locked position.
8. Hold the hot-swap lock bar in the closed position, lock the side cover key lock, and close the server door.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. The SCSI ID for each hot-swap hard disk drive is printed on the hot-swap lock bar. Table 6 on page 50 lists the SCSI IDs for the hard disk drives and backplane that are connected to one channel in hot-swap hard disk drive models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A.

Table 6. SCSI IDs for standard hot-swap hard disk drives and backplane

Device	SCSI ID
Drive bay 9	0
Drive bay 8	1
Drive bay 7	2
Drive bay 6	3
Drive bay 5	4
Drive bay 4	5
Backplane	8

Installing non-hot-swap hard disk drives

Bays 4, 5, and 6 are in the drive cage. The drive cage is behind the front of the adapter-support bracket. Drives are installed starting at the bottom in bay 7. Additional drives are then installed in bays 6, 5, and 4.

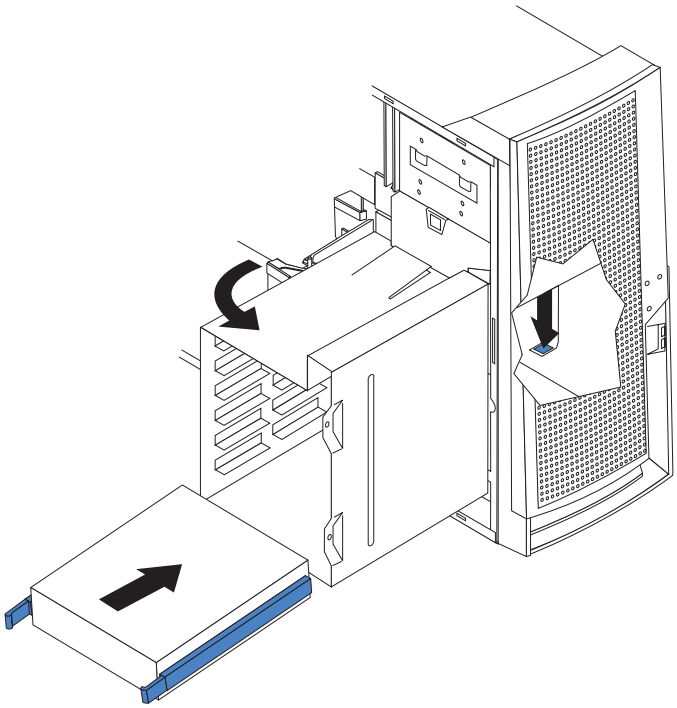
Notes:

1. You can install up to four non-hot-swap hard disk drives in your server. The additional space in the drive cage above bay 4 is not designed to accommodate any additional drives.
2. When installing non-hot-swap hard disk drives, you might find it easier to lay the server on its side. If you do so, and your server has stabilizing feet that rotate, move the feet inward toward the server, so that they do not break.

Complete the following steps to install a drive in bay 4, 5, or 6:

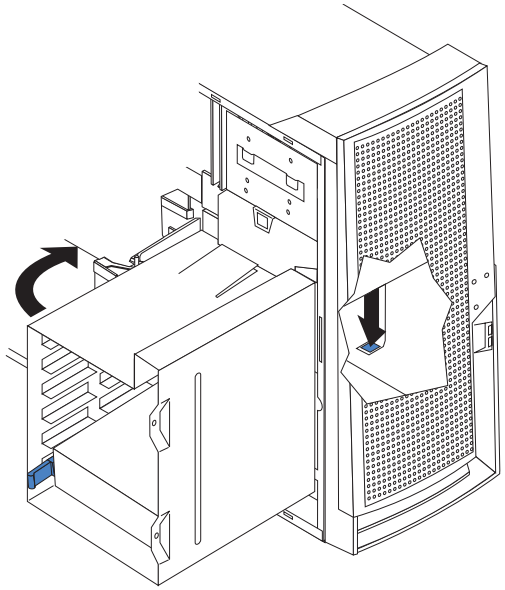
1. Review the safety information beginning on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 39).
5. Remove the frame-support bracket (see “Removing the frame-support bracket” on page 40).

6. Press the drive cage release lever down, and then rotate the cage out of the server until the drive-cage retention tab locks into place and the open ends of the drive slots and installed drives are facing you. Ensure that the drive cage locks into place over the drive-cage retention tab by rotating the drive cage all the way out of the server.



7. Attach the blue guide rails to the side of the drive using the screws that are provided.
8. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage. Clear any cables that might impede the replacement of the drive cage.
9. Connect one end of the SCSI signal cable into the back of the drive and make sure that the other end of this cable is connected into the SCSI connector on the system board. See “Power and signal cables for internal drives” on page 54 for additional information about cabling drives and “System board internal cable connectors” on page 34 for the location of SCSI connectors on the system board. If there are open connectors on the cables connecting existing SCSI drives, these cables can be used to connect the new drive.
10. Route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor and memory.
11. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

12. Push the drive cage outward, and press in on the drive-cage release tab; then, rotate the cage back into the server.



13. If you have other options to install or remove, do so now.
14. Replace the frame-support bracket (see “Removing the frame-support bracket” on page 40).
15. Replace the side cover (see “Installing the side cover” on page 67).
16. Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Installing a 5.25-inch removable-media drive

Your server comes with one integrated drive electronics (IDE) CD-ROM drive. The CD-ROM drive bay supports a 5.25-inch, half-high, removable-media drive.

You can install an additional 5.25-inch, half-high, removable-media drive in bay 2.

A three-drop power cable comes with your server. Use this cable to connect power to the removable-media drives.

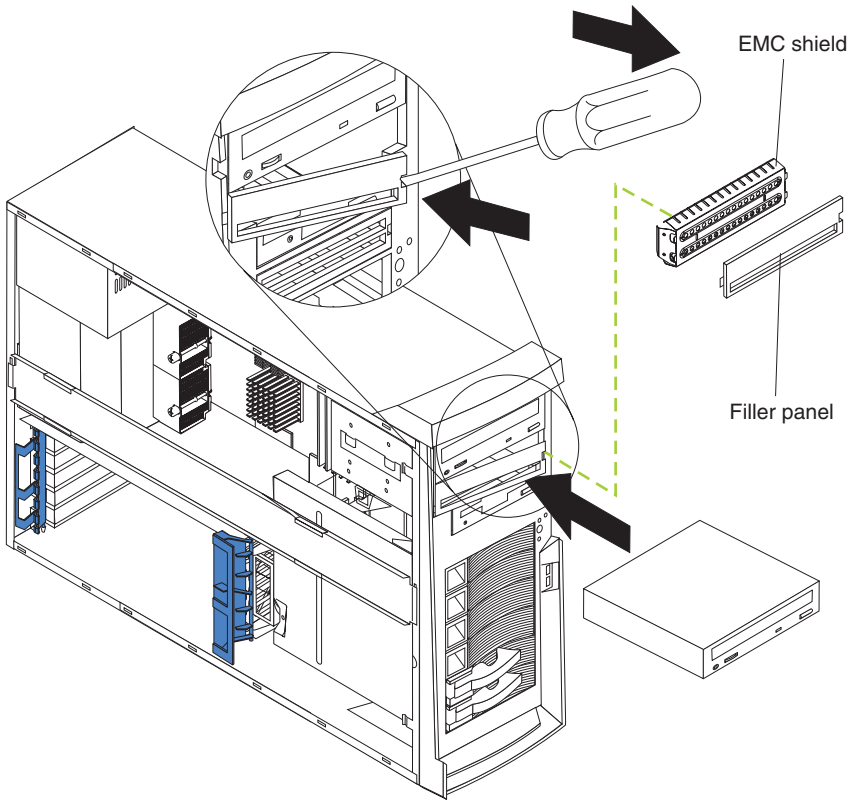
Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Verify that you have all the cables and other equipment specified in the documentation that comes with the drive.

Complete the following steps to install a removable-media drive in bay 2 (see “Internal drive bays” on page 46):

1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 39).

5. Remove the front bezel (see “Removing the front bezel” on page 40).
6. Remove the frame-support bracket (see “Removing the frame-support bracket” on page 40).
7. Use a screwdriver to pry the filler panel and EMC shield away from the server.



Note: If you are installing a drive that contains a laser, observe the following safety precaution.

Statement 3

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Danger

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

8. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
9. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

   Note: You might find it easier to install the new drive into the appropriate opening on the front, and then attach the cables.
10. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay; then, use the two screws to attach the drive to the drive cage. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit, supplied with your option, to the 3.5-in. drive.
11. Determine whether the drive is an IDE or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and the other end of this cable into the appropriate IDE or SCSI connector on the system board.
    - If you are installing a SCSI removable-media drive, use the one-drop SCSI cable that comes with the drive and connect it to SCSI channel B (SCSI2). See “Power and signal cables for internal drives” for additional information about cabling drives and “System board internal cable connectors” on page 34 for the location of IDE and SCSI connectors on the system board.
    - If there are open connectors on the cables connecting existing IDE or SCSI drives, this cable can be used to connect the new drive. The 4-connector SCSI cable that comes with non-hot-swap model servers cannot be used to connect a SCSI drive in bay 2.
12. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and memory.
13. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
14. If you have other options to install or remove, do so now.
15. Replace the frame-support bracket (see “Removing the frame-support bracket” on page 40).
16. Replace the front bezel (see “Replacing the bezel” on page 67).
17. Replace the side cover (see “Installing the side cover” on page 67).
18. Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Power and signal cables for internal drives

Your server uses cables to connect IDE and SCSI devices to the power supply and to the system board. (See “System board internal cable connectors” on page 34 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in your server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.

- When you install a drive, ensure that one of the drive connectors of the signal cable is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.
- The server has two IDE buses, primary and secondary. Each of these buses supports up to two IDE devices. The primary IDE bus uses connector IDE1 on the system board and the secondary IDE bus uses connector IDE2.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size.
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect IDE, SCSI, and diskette drives to the system board. Two or three types of signal cable come with your server:
  - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the primary or secondary IDE connector on the system board. The spare connector can be used to connect an additional IDE drive to your server.

    The CD-ROM drive is attached to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device.
  - **Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is attached to the connector (FDD1) on the system board.
  - **SCSI:** A round SCSI cable connects SCSI devices to the integrated SCSI controller with RAID capabilities on the system board. For hot-swap models, the maximum cable length that supports Ultra320 SCSI hard disk drives is 16 inches. For more information about connecting SCSI devices, see the SCSI documentation.

Installing memory modules

You can increase the amount of memory in your server by installing memory modules. Your server uses industry-standard PC2100 double-data-rate (DDR) dual inline memory modules (DIMMs).

Notes:

1. The system board contains four DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your server are 128 MB, 256 MB, 512 MB, 1 GB, and 2 GB. Your server supports a minimum of 256 MB and a maximum of 8 GB of system memory.
3. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.

4. Your server comes with two 128 MB or 256 MB DIMMs (for a total of 512 MB or 1024 MB) installed in the DIMM 3 and DIMM 4 memory connectors. When you install additional DIMMs, be sure to install them as a pair in DIMM connectors 1 and 2.
5. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 3 and DIMM 4 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers. If you install a second pair of DIMMs in DIMM 1 and DIMM 2 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs you installed in DIMM 3 and DIMM 4 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 1 and DIMM 2 memory connectors must match each other.
6. Install only 133 MHz (memory bus), 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification. For a list of supported options for your server, go to http://www.ibm.com/us/compat/ on the World Wide Web.
7. Your server supports Chipkill™ memory if the DIMMs are all type x4 and are 256 MB or larger. Using any 256 MB DIMMs or DIMMs that are not type x4 on your server disables Chipkill memory.

Complete the following steps to install a DIMM:

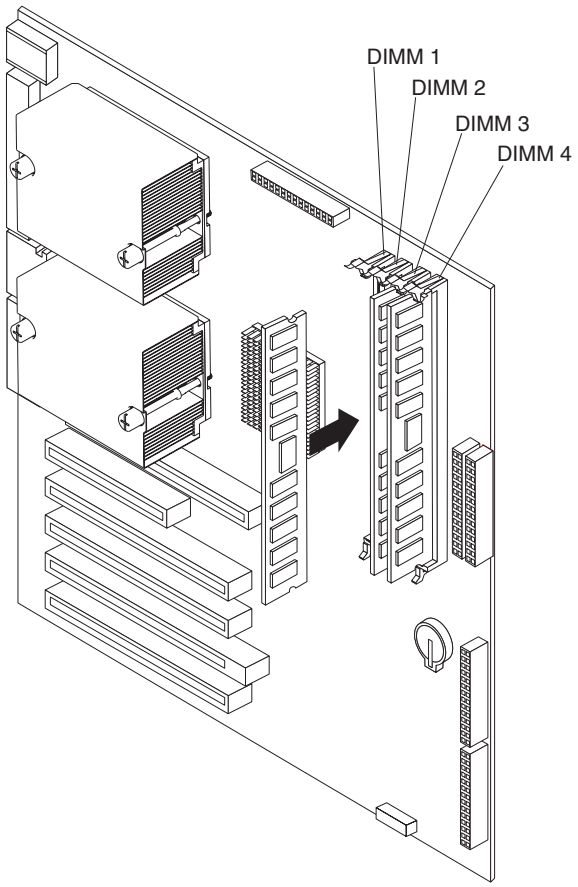
1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and disconnect all power cords; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 39).
4. Remove the frame-support bracket (see “Removing the frame-support bracket” on page 40).
5. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the order shown in the following table.

Table 7. DIMM installation sequence

Pair	DIMM connectors	Diagnostic reference
First	DIMM 3 and DIMM 4	Bank 2
Second	DIMM 1 and DIMM 2	Bank 1

6. Open the retaining clips and, if necessary, remove any existing DIMM.
7. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
8. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.

9. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, then reinsert it.



10. If you have other options to install or remove, do so now.
11. Replace the frame-support bracket (see “Removing the frame-support bracket” on page 40).
12. Replace the side cover (see “Installing the side cover” on page 67).
13. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the server.

Installing a microprocessor

Your server comes with one microprocessor installed on the system board. Your server supports up to two microprocessors. With two microprocessors, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

Before you begin:

- Thoroughly review the documentation that comes with the microprocessor to determine the required BIOS update. The latest level of BIOS code for your server is available through the World Wide Web. See the *User's Guide* on the IBM *xSeries Documentation* CD for the World Wide Web addresses.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and other options, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web.

Attention: To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical. You can use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor on your system board.

Important: A microprocessor must always be installed in socket CPU1 of the system board.

Notes:

1. To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
2. Terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.
3. The microprocessor speeds are automatically set for this server; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.
4. If you need to replace a microprocessor, call for service.
5. For additional illustrations of the system-board components, see "System board" on page 34.

Configuring the operating system

Some operating systems need to be configured to support an additional microprocessor. See your operating-system documentation for information.

If Windows 2000 is installed in the server, complete the following steps to configure the operating system. Check the Microsoft web page at http://www.microsoft.com for updates to these instructions. In the Microsoft Web page, type `multiprocessor support` in the **Search** field and press Enter.

1. Back up the hard disk.
2. From the desktop, click **Start → Settings → Control Panel**.
3. In the Control Panel window, double-click the **System** icon.
4. In the System Properties window, click the **Hardware** tab; then, click **Device Manager**.
5. In the Device Manager window, click on the plus sign (**+**) beside **Computer** to expand the list; then, double-click **ACPI Uniprocessor PC**.
6. In the Advanced Configuration and Power Interface (ACPI) PC Properties window, click the **Driver** tab; then, click **Update Driver**.
7. In the Update Device Driver Wizard window, click **Next**.
8. In the next window, click **Display a list of known drivers for this device so that I can choose a specific driver**; then, click **Next**.
9. In the next window, click **Show all hardware of this device class**. From the **Models** list, select **ACPI Multiprocessor PC**; then, click **Next**.

10. If the configuration shown in the wizard is satisfactory, click **Next** to save the configuration.
11. Click **Finish** to complete the process.
12. Click **Yes** to restart the server.
13. Continue with step 1 of “Installing the microprocessor”.

Installing the microprocessor

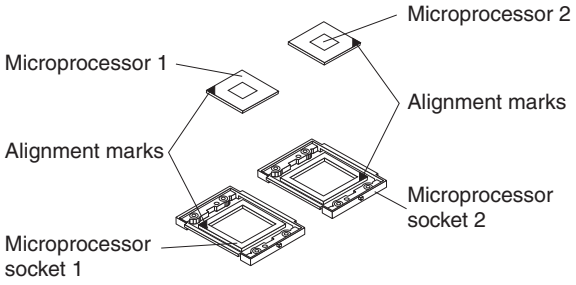
Complete the following steps to install an additional microprocessor:

1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 39).
5. Remove the frame-support bracket (“Removing the frame-support bracket” on page 40).
6. Remove the adapter airflow guide:
   a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
   b. Slide the adapter airflow guide out of the guides on the air baffle and front adapter-support bracket; then, remove it from the chassis.
7. Remove the air baffle by unhooking it from its retaining tabs and lifting it off the chassis.
8. Locate the second microprocessor socket.
9. Remove the microprocessor baffle from the second microprocessor socket.
10. If the second microprocessor socket is covered with protective film, peel and remove the film.

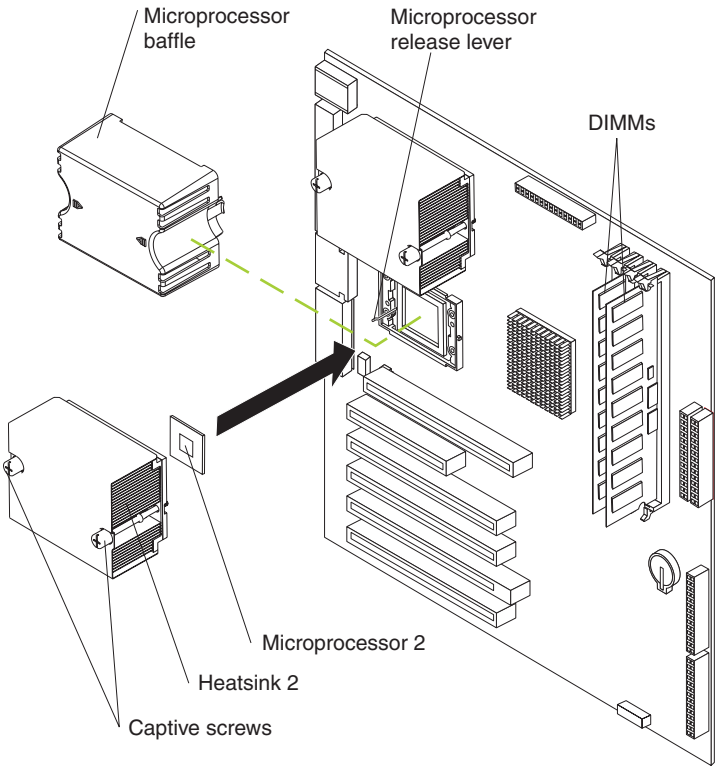
11. Install the microprocessor:
    a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
    b. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.

       Attention:

       1) Do not use excessive force when pressing the microprocessor into the socket.
       2) Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the microprocessor-release lever. The following illustration shows the alignment marks for both microprocessors and sockets.

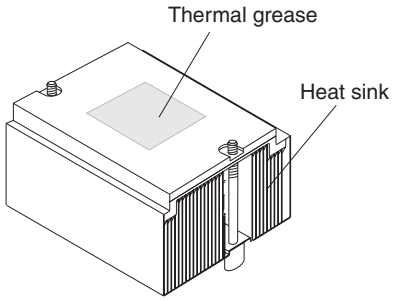


    c. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.
    d. Carefully close the microprocessor-release lever to secure the microprocessor in the socket.



12. Install the heat sink on the microprocessor:

Attention: Do not set the heat sink down after you remove the plastic cover and do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.



a. Remove the plastic cover from the bottom of the heat sink.
b. Align and place the heat sink on top of the microprocessor, grease side down, in the retention bracket. Press firmly on the heat sink.

   Attention: Alternate the tightening of the two captive screws to prevent damage to the microprocessor. Ensure that the screws are completely tightened (until they stop); otherwise, damage to the microprocessor will occur.
c. Secure the heat sink to the microprocessor by tightening the captive screws. Alternate between the two captive screws in the heat sink while tightening them.

13. Install the air baffle.
14. Install the adapter airflow guide:
    a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
    b. Slide the adapter airflow guide into the guides on the air baffle and front adapter-support bracket; then, push it into place, using care not to damage any cables.
    c. Rotate the front and rear adapter-retention brackets to the closed (locked) position.
15. If you have other options to install or remove, do so now.
16. Replace the frame-support bracket (see “Removing the frame-support bracket” on page 40).
17. Replace the side cover (see “Installing the side cover” on page 67).
18. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the server.

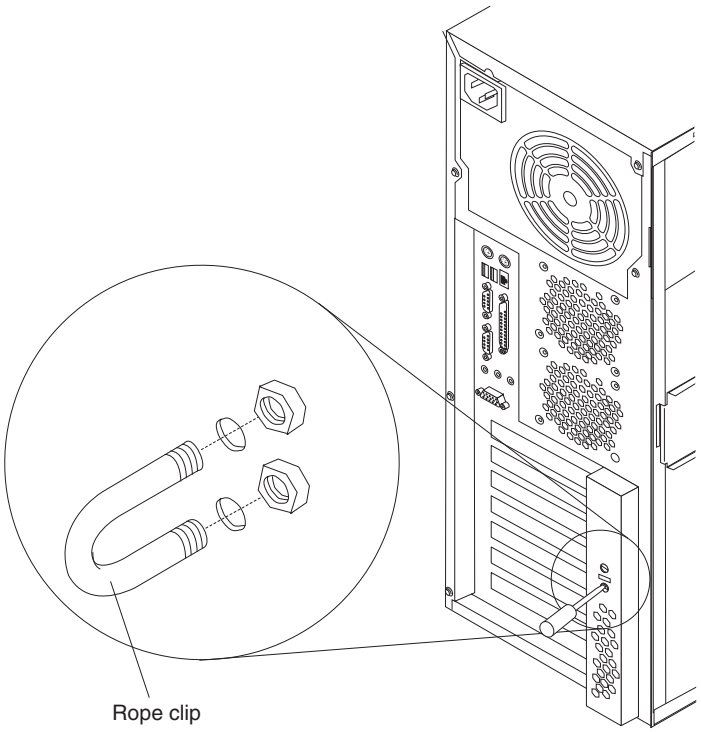
Installing a security rope clip

To help prevent theft, you can add a security rope clip and cable to your server.

Complete the following steps to install a rope clip:

1. Remove the side cover (see “Removing the side cover” on page 39).
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.

4. Thread a cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, be certain it does not interfere with other cables connected to the server.



5. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 67.

Replacing a hot-swap power supply

Some models of your server come with two hot-swap power supplies. You do not need to turn off the server to replace a hot-swap power supply, but you must replace only one power supply at a time.

If you install or remove a power supply, observe the following precautions.

Statement 8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

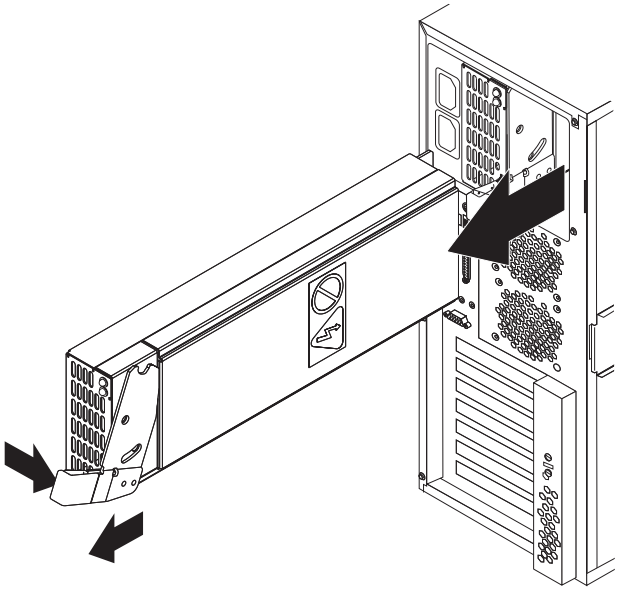
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 12

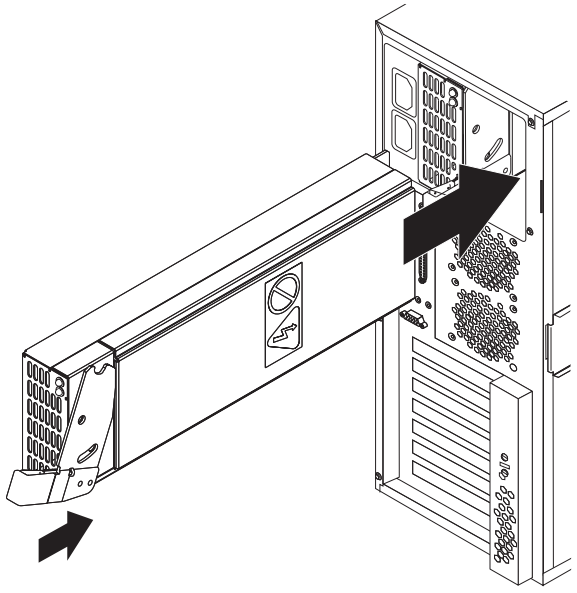
CAUTION:
The following label indicates a hot surface nearby.

Complete the following steps to replace a hot-swap power supply:

1. Review the safety information beginning on page 125 and “Installation guidelines” on page 36.
2. Press the orange release lever on the selected power supply; then, pull the power supply out of the bay and set it aside.



3. Make sure the power-supply handle is in the open position; then, slide the power supply all the way into the chassis before placing the power-supply handle into the locked position.



4. If the server is not on, turn on the server.
5. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.

Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Note: After you replace the battery, you must reconfigure your server and reset the system date and time.

Statement 2

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

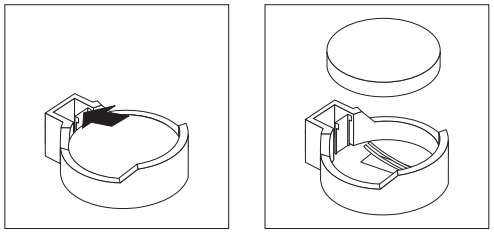
- **Throw or immerse into water.**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

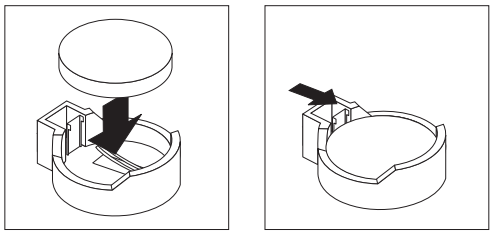
Complete the following steps to replace the battery:

1. Review the safety information beginning on page 125 and “Installation guidelines” on page 36.
2. Follow any special handling and installation instructions supplied with the replacement battery.
3. Turn off the server and all attached devices.
4. Disconnect all power cords; then, disconnect all external cables.
5. Remove the side cover and frame-support bracket. (see “Removing the side cover” on page 39).

6. Remove the adapter airflow guide.
   a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
   b. Slide the adapter airflow guide out of the guides on the air baffle and front adapter-support bracket; then, remove it from the chassis.
7. Remove any adapters that impede access to the battery.
8. Remove the battery:
   a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
   b. Use your thumb and index finger to lift the battery from the socket.



9. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.



10. Replace any adapters that were removed.
11. Install the adapter airflow guide.
    a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
    b. Slide the adapter airflow guide into the guides on the air baffle and front adapter-support bracket; then, push it into place, using care not to damage any cables.
    c. Rotate the front and rear adapter-retention brackets to the closed (locked) position.
12. Replace the frame-support bracket and side cover. (See “Removing the frame-support bracket” on page 40 and “Installing the side cover” on page 67.)
13. Connect all external cables; then, connect the power cords.
14. Turn on the server.
15. Start the Configuration/Setup Utility program and set configuration parameters as needed. See the *User’s Guide* on the IBM *xSeries Documentation* CD.

Completing the installation

To complete installation of an option, you must reinstall front bezel, reinstall the side cover, reconnect all the cables that you disconnected earlier and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

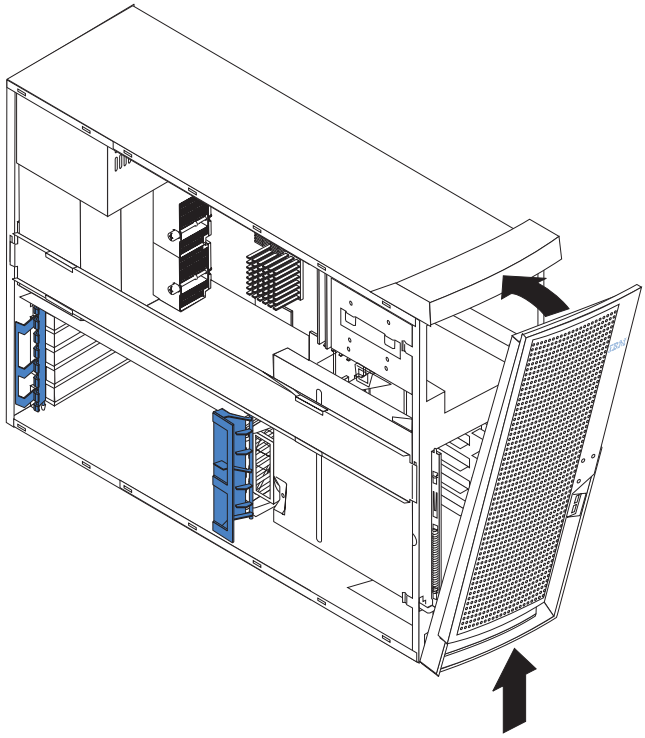
Attention: For proper cooling and airflow, replace the side cover before or shortly after turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.

Note: If you have just plugged the power cords of your server into electrical outlets, you will have to wait approximately 20 seconds before pressing the power-control button.

Replacing the bezel

Complete the following steps to replace the front bezel:

1. Insert the two tabs on the bottom of the front bezel into the matching holes on the server chassis.
2. Push the top of the front bezel toward the server until the two tabs at the top of the front bezel snap into place.



3. For hot-swap hard disk drive models, make sure the side cover is unlocked; then, insert the hot-swap lock bar into the slots on the bezel and rotate it to the locked position. The hot-swap lock bar locks when you lock the side cover key lock.

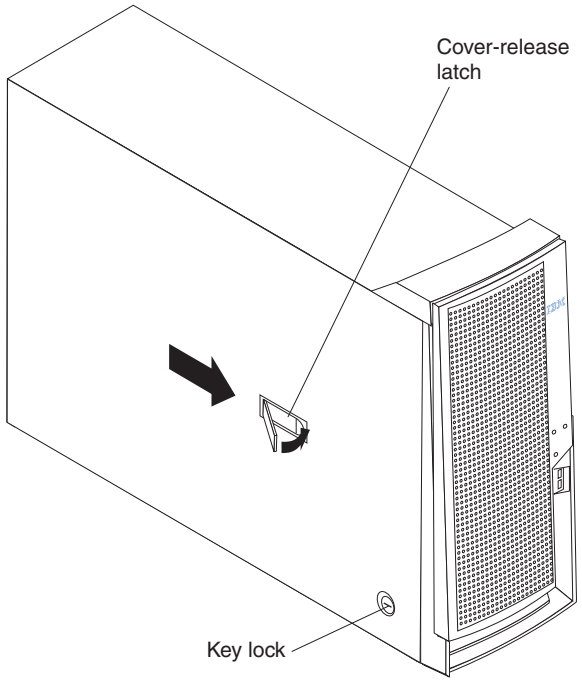
Installing the side cover

If you removed the frame-support bracket or front bezel, reinstall them before you replace the side cover. See “Removing the frame-support bracket” on page 40 and “Replacing the bezel”.

Note: The rear adapter-retaining bracket rests against the server side cover. You might find it easier to lay the server on its side to replace the side cover.

Complete the following steps to replace the side cover:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Place the bottom lip of the side cover over the bottom edge of the server chassis.
3. Rotate the side cover to a vertical position, inserting the tabs at the top of the side cover into the matching slots in the server chassis.
4. Press down on the cover-release latch as you slide the side cover forward until it locks in place. Press down on the cover-release-latch button as you close the cover-release latch to lock the side cover.



5. For hot-swap hard disk drive models, open the server door and hold the hot-swap lock bar in the closed position, lock the side cover key lock, and close the server door.
6. If your server has stabilizing feet that rotate, make sure that the four stabilizing feet are rotated outward so that they properly support the server. Rotate each foot outward 90 degrees (see “Moving the stabilizing feet” on page 38).
7. Reconnect the external cables and power cords to the server; then, connect the power cords to electrical outlets.
8. Turn on the attached devices; then, turn on the server.

Updating your server configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. See “Using the Configuration/Setup Utility program” on page 7 for more information about the Configuration/Setup Utility program.

Some options have device drivers that you need to install. See the documentation that comes with your option for information about installing any required device drivers.

Your server comes with one or two microprocessors installed on the system board. If your server comes with two microprocessors, or if your server comes with one microprocessor and you have installed an additional microprocessor, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system to support SMP. See the ServerGuide information in the *User's Guide* on the IBM *xSeries Documentation* CD and to your operating-system documentation for additional information.

If your server has a RAID configuration using the integrated SCSI controller with RAID capabilities or has a ServeRAID controller installed and you have installed or removed a hard disk drive, see the ServeRAID documentation on the *IBM ServeRAID Support* CD for information about configuring your disk arrays.

Connecting external options

If you install an optional SCSI adapter, or use channel B on the integrated SCSI controller for external devices, you can attach external SCSI devices, such as a SCSI storage expansion enclosure, to your server. To use channel B for external SCSI devices, remove the SCSI knockout from the rear of the server and secure the free end of the channel B cable in the new opening.

You can attach additional external options to the input/output (I/O) connectors on the front and rear of your server. (See "Input/output ports" for more information.)

Complete the following steps to attach an external device:

1. Review the safety information beginning on page 125, "Installation guidelines" on page 36, and the documentation that comes with your options.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Note: If you are attaching an external SCSI device, see "Ultra320 SCSI connector" on page 72 for information about SCSI cabling and SCSI IDs.

Installing the server in a rack

An optional Tower-to-Rack Kit is needed to convert your server from a tower model to a rack model. You can then install the server in a rack cabinet. To order a Tower-to-Rack Kit for your server, contact your IBM marketing representative or authorized reseller.

Input/output ports

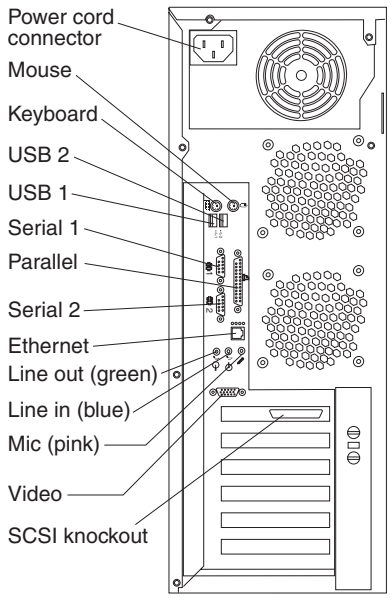
Connect optional external devices to the connectors on the front and rear of the server.

Your server has the following input/output (I/O) connectors:

- Three audio (line in, line-out, and microphone)
- One Ethernet (RJ-45)
- One keyboard
- One mouse

- One parallel
- Two serial
- Four universal serial bus (USB) v 2.0
- One video

The following illustration shows the locations of these connectors.

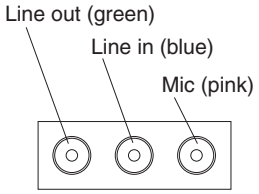


The following sections describe these connectors.

If you have an optional Remote Supervisor Adapter (system-management adapter) installed in PCI slot 1, your server also has an additional Ethernet connector, an additional serial connector, and an Advanced System Management (ASM) Interconnect connector. See the documentation that comes with the Remote Supervisor Adapter for more information about the ASM Interconnect network.

Audio connectors

The audio connectors are used to connect external audio equipment to the server.



Line out (green)

The server sends audio signals through this connector to powered speakers with built-in amplifiers, headphones, a multimedia keyboard, or the audio line-in connector on a stereo system. The internal speaker in your server is disabled when any device is attached to the line-out connector.

Line in (blue)

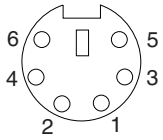
The server receives audio signals through this connector from an external audio device.

Microphone (pink)

Connect a microphone to this connector to record sounds onto the hard disk or to use speech recognition software.

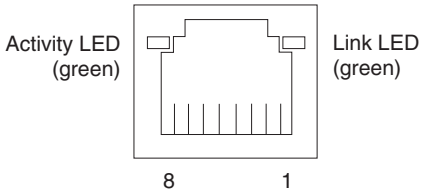
Auxiliary-device (pointing-device) connector

Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



Ethernet (RJ-45) connector

The following illustration shows an Ethernet connector.

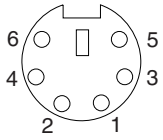


Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

For more information about the Ethernet controller, see the *User's Guide* on the IBM *xSeries Documentation* CD.

Keyboard connector

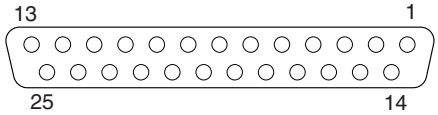
Use this connector to connect a PS/2 (non-USB) keyboard. The following illustration shows a keyboard connector.



If you attach a keyboard to this connector, USB ports and devices are disabled during the power-on self-test (POST).

Parallel connector

Use this connector to connect a parallel device. The following illustration shows a parallel connector.

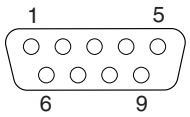


The parallel connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes of operation. To configure the parallel port, use the **Devices and I/O Ports** option in the Configuration/Setup Utility program. See the *User's Guide* for more information.

If you configure the parallel port to operate in bidirectional mode, use an IEEE 1284-compliant cable that does not exceed 3 meters (9.8 ft).

Serial connectors

Use the serial connectors to connect serial devices. The following illustration shows a serial connector.



Ultra320 SCSI connector

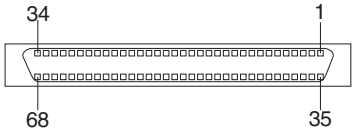
You can install up to four internal SCSI devices using the SCSI cable that comes with some models of the server. Other server models might come with one SCSI cable that is connected from the internal SCSI channel A connector to the standard hot-swap-drive backplane. You can attach additional internal SCSI devices to the other internal SCSI channel B connector, or you can use channel B for external SCSI devices. To use channel B for external SCSI devices, remove the SCSI knockout from the rear of the server and secure the free end of an optional channel B cable in the new opening.

If you want to attach external SCSI devices to the server without using the internal SCSI channel B, you must install an optional SCSI adapter.

Notes:

1. External SCSI devices connected to internal SCSI channel B will operate asynchronously.
2. If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system-board SCSI connector to an internal channel connector on the RAID adapter (except for the ServeRAID-5i controller, which uses the system-board integrated SCSI controller with RAID capabilities). See “Cabling an optional SCSI adapter” on page 44 for additional information.

An optional external SCSI connector might be installed on the rear of the server. Use this connector to connect external SCSI devices. The following illustration shows the SCSI standard 68-pin, female D-shell SCSI connector.



Your server has an integrated SCSI controller with RAID capabilities. This dual-channel controller supports two independent, Ultra320 SCSI channels. The SCSI connectors for both channels are on the system board. Each channel supports up to 15 SCSI devices. This controller uses:

- Double-transition clocking to achieve up to 320 MB-per-second data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic-redundancy checking (CRC), instead of the usual parity checking, to improve data reliability

- An active terminator for SCSI bus termination

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs.

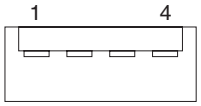
The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device to an optional SCSI adapter, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

SCSI cabling requirements

You can install four internal SCSI devices using the SCSI signal cable that comes with some server models. If you plan to attach external SCSI devices, you must order an additional SCSI cable, remove the SCSI knockout from the rear of the server, and connect the new cable from the system board to this opening. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative. When using an optional SCSI adapter, you must also connect the SCSI adapter to the SCSI LED (J18) connector on the system board receive an indication of SCSI hard-disk drive activity. See “System board internal cable connectors” on page 34 for the location of the SCSI connectors. For information about the maximum length of SCSI cable, see the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at http://www.ansi.org/ on the World Wide Web. Adhering to these standards will help to ensure that your server operates properly.

Universal Serial Bus connectors

Use a USB connectors to connect a USB device. USB technology transfers data at up to 12 megabits per second (Mbps) with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.



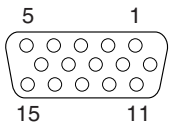
Use a 4-pin USB cable to connect external devices to USB connectors. If you need to connect more USB devices than the server has USB connectors for, use a USB hub to connect additional devices.

If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during power-on self-test (POST).

If you connect a USB keyboard that has a mouse port, the keyboard emulates a mouse, and you cannot disable the mouse settings in the Configuration/Setup Utility program.

Video connector

The super video graphics array (SVGA) video adapter is installed in mini-PCI slot 6 on the system board. There is one video connector on the rear of the server. Use the video connector to connect a monitor or other display. The following illustration shows an industry standard 15-pin analog video connector on the rear of the server.



Chapter 5. Field replaceable units

The following information describes procedures for removing and installing certain components inside the system. Only a qualified service technician is authorized to replace the components described in this section.

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM xSeries products. See the parts listing in “System replaceable units” on page 118 to determine if the component being replaced is a customer replaceable unit (CRU) or a FRU.

Note: Before servicing this system, read “Installation guidelines” on page 36 and “Safety information” on page 125.

Power button

Before you begin:

- Read the “Installation guidelines” on page 36.
- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the power button, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the front bezel. See “Removing the front bezel” on page 40.
5. If your server has hot-swap hard disk drives installed, remove them. See “Hot-swap hard disk drive cage” on page 78.
6. Disconnect the SCSI signal cable from the backplane.

   Note: Be sure to remove the hot-swap drive bay filler panels so that they are not damaged.
7. Push downward on the cage-release latch, and rotate the drive cage outward until it locks in the vertical position, so that you can reach through to the other side of the power-switch and LED panel cable.

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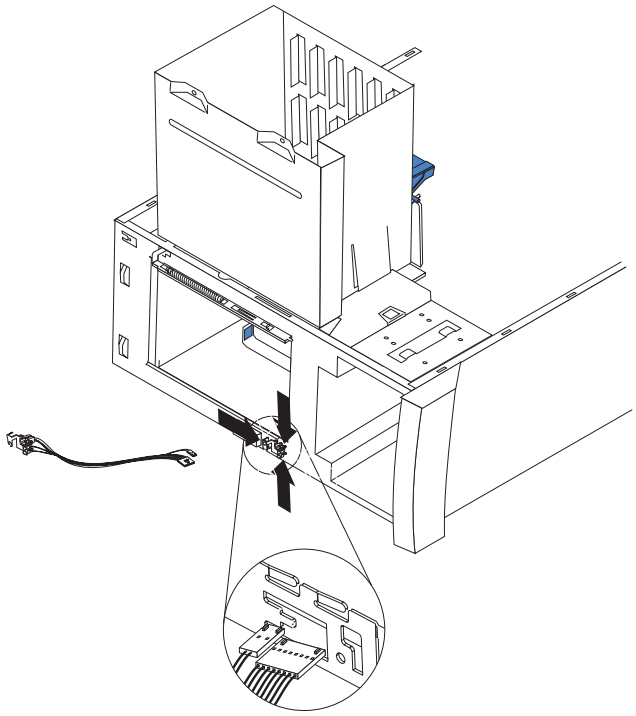
8. To remove the power-switch and LED panel, press in on the tab on the left side of the panel; then, squeeze the top and bottom of the right-side of the panel and carefully pull the panel away from the system.



9. Note where the power-switch and LED panel cables connect to the system board; then, carefully disconnect the cables from the system board.

   Notes:

   a. You might need to remove the diskette, SCSI, and IDE cables to access the power switch and LED panel cable connector.
   b. Some cables might have two connectors for you to disconnect.
   c. See the system service label for system board connector locations.

10. Place a screwdriver against the bottom release latch of the power button and gently press upward and slide the latch through the aperture.
11. Gently pinch together the upper release latches and slide the latches through the aperture and remove the power button.

To replace the power button, complete the following steps:

1. Thread the power button and LED panel cables through the aperture in the chassis and bottom release latch.
2. Connect the power button and LED panel cables to the power button and LED panel connectors on the system board.
3. Press in on the tab on the left side of the panel; then, squeeze the top and bottom of the right side of the panel and carefully push the panel into place in the aperture in the chassis.
4. Press in on the drive-cage release tab, and rotate the drive cage back into the server.
5. Connect the SCSI signal cable to the SCSI backplane.
6. Replace the hot-swap hard disk drives. See “Installing a hot-swap hard disk drive” on page 48.
7. Replace the front bezel. See “Replacing the bezel” on page 67.

8. Install the side cover. See “Installing the side cover” on page 67.
9. Connect external cables and the power cable, and turn on the server.

Microprocessor and heat sink

Before you begin:

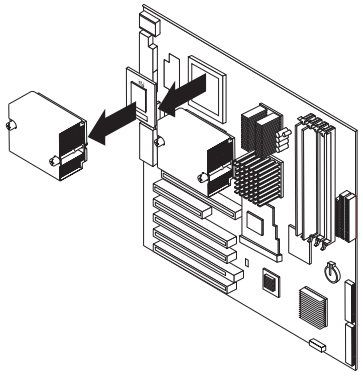
- Read “Installation guidelines” on page 36.
- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the microprocessor and heat sink, complete the following steps:

1. Turn off the server and remove external cables.
2. Remove the side cover and frame-support bracket (see “Removing the side cover” on page 39 and “Removing the frame-support bracket” on page 40).
3. Disconnect any cables that impede access to the microprocessor.
4. Remove the heat sink from the microprocessor:
   a. Loosen the two captive screws on either side (in leaf spring enclosures) of the fansink.
   b. With the two captive screws loosened, pivot the leaf spring assemblies outward and out of the notches on the fan sink assembly.
   c. Lift the heat sink up and out of the server.

      Note: It might be necessary to gently twist the heat sink to loosen it from the microprocessor.

      Important: Be careful when handling the adhesive material on the microprocessor. If the adhesive material on the microprocessor will be reused, do not contaminate it. If replacement adhesive material is provided with the replacement part, be sure to remove all traces of existing adhesive material from the microprocessor before applying the new adhesive material.
5. Rotate the microprocessor socket lever arm upward to its maximum vertical position, and lift the microprocessor up and out of the server.



6. To install a microprocessor, see “Installing a microprocessor” on page 57.

Thermal grease

This section contains information about removing and replacing the thermal grease between the heat sink and the microprocessor. The thermal grease must be replaced any time the heat sink has been removed from the top of the microprocessor and is going to be reused, or when debris is found in the grease.

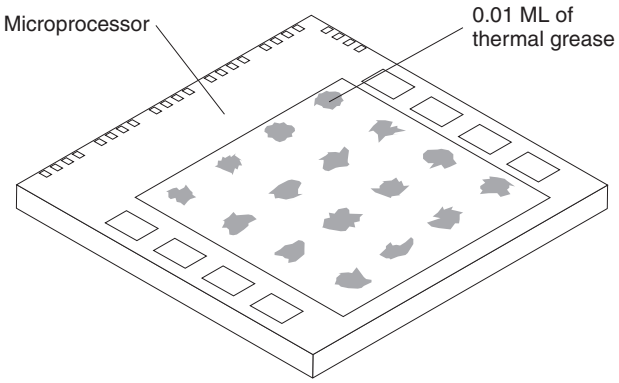
Note:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

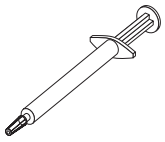
Complete the following steps to replace damaged or contaminated thermal grease on the microprocessor and heat sink:

1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   Note: Be sure that all of the thermal grease is removed.
4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal grease syringe to place 16 uniformly spaced dots of 0.01ML each on the top of the microprocessor.



6. Install the heat sink onto the microprocessor as described in “Microprocessor and heat sink” on page 77.

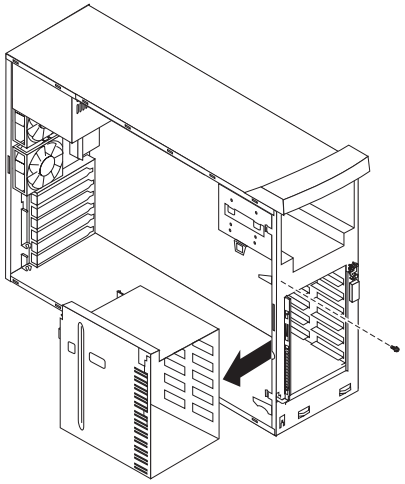
Hot-swap hard disk drive cage

Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the hot-swap hard disk drive cage, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect all external cables.
3. Remove the front bezel. See “Removing the front bezel” on page 40.
4. Remove the side cover. See “Removing the side cover” on page 39.
5. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board.
8. Remove the screw from the front of the hard disk drive cage.
9. Move the cage slightly in and up until it is free of the chassis and lift it out of the server.



To replace the hard disk drive cage, reverse the steps.

Hot-swap backplane

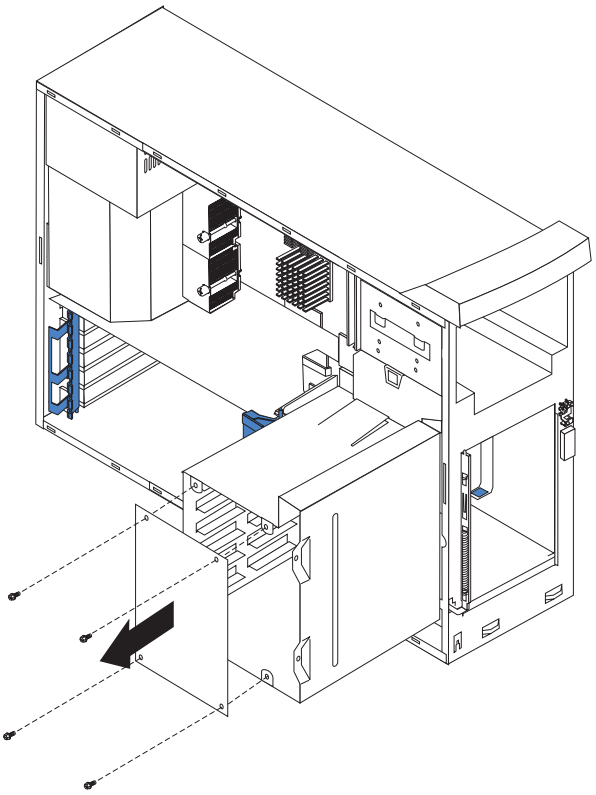
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the hot-swap backplane, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the front bezel. See “Removing the front bezel” on page 40.
4. Remove the side cover. See “Removing the side cover” on page 39.
5. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board and the backplane.
8. Press down on the drive cage release latch and swing the drive cage out.

9. Remove the screws securing the hot-swap backplane to the drive cage.



To replace the hot-swap backplane, reverse the steps.

Non-hot swap power supply

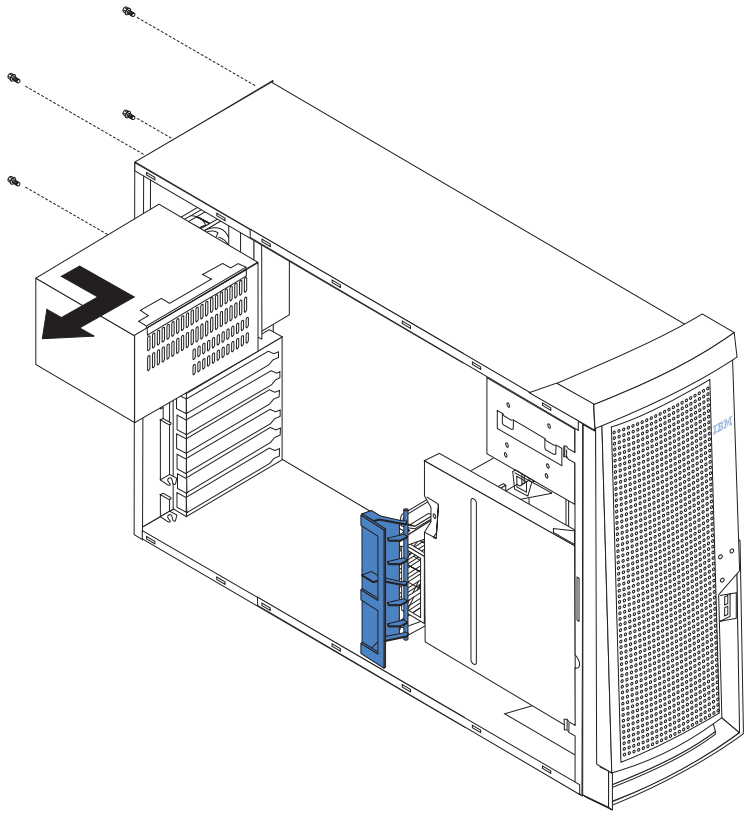
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the non-hot-swap power supply, do the following:

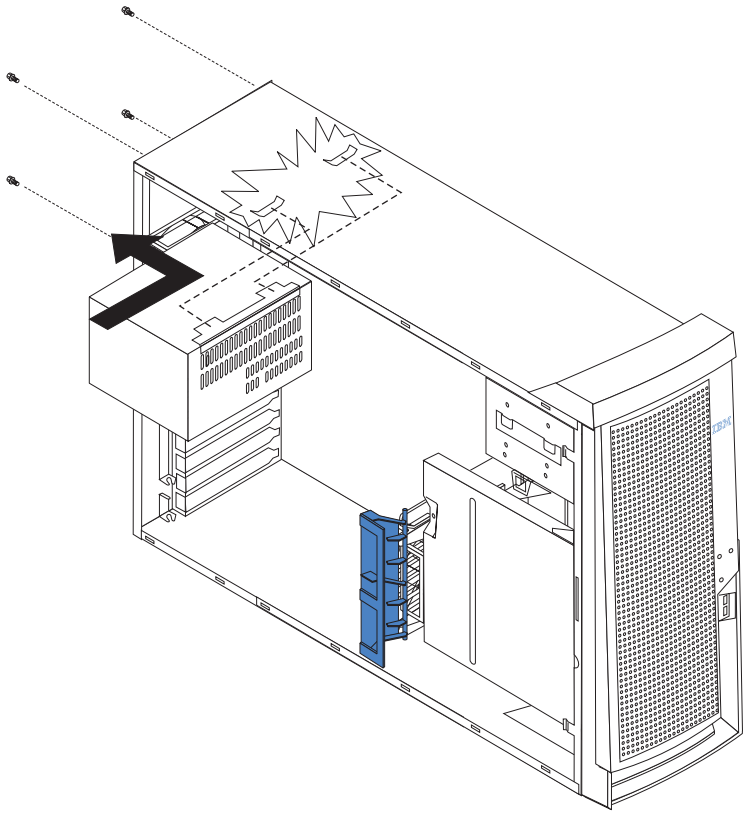
1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the cover. See “Removing the side cover” on page 39.
4. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
5. Disconnect internal cables from the system board and drives.
6. Remove the screws from the rear of the server.

7. Gently move the power supply away from the chassis and lift it out of the server.



To replace the non-hot-swap power supply, complete the following steps:

1. Align the tabs on the top of the power supply with the tab slots on the underside of the top rear of the chassis, and slide the power supply toward the rear of the chassis.
2. Secure the power supply to the rear of the chassis with the four screws.



Front fan

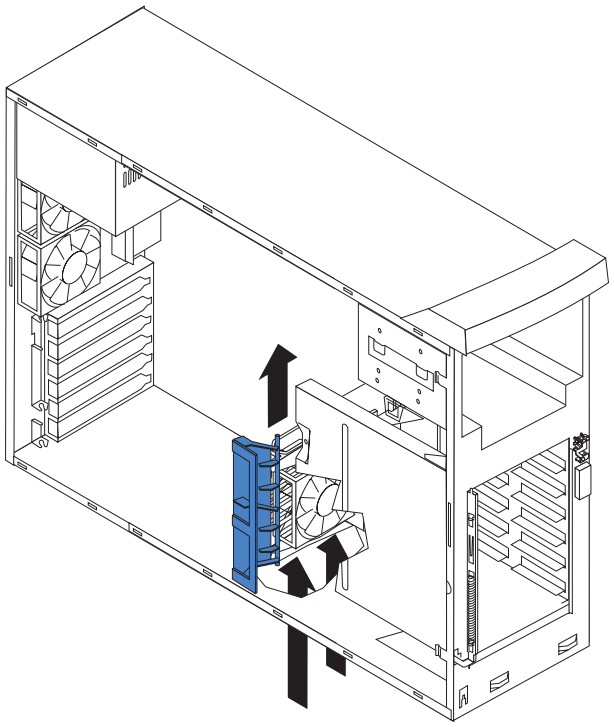
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

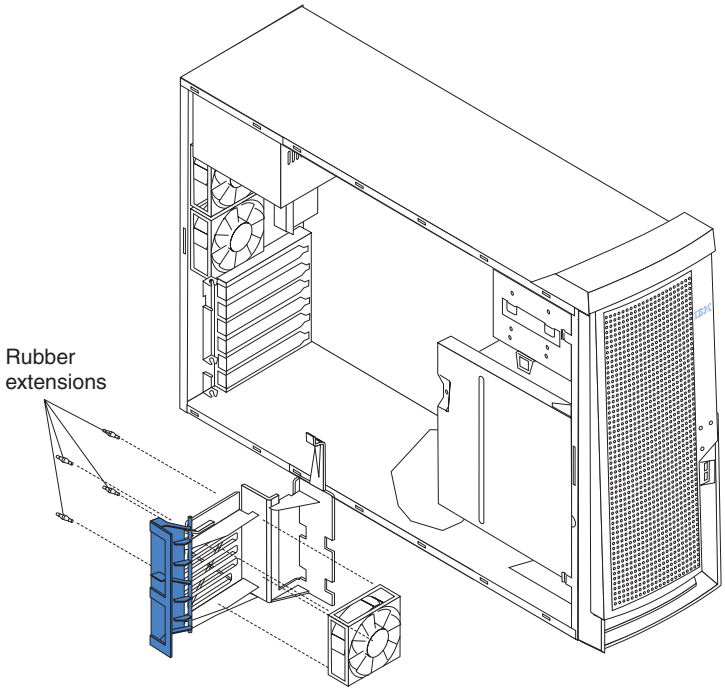
To remove the front fan, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
5. Remove the fan cable from the system board.

6. Remove the adapter-support bracket and fan housing.



7. Use side cutters to cut the four rubber extensions on the adapter-support bracket.



8. Gently pry the fan away from the adapter-support bracket and lift it up and out.

To install the new front fan assembly, complete the following steps:

1. Place the fan in position on the adapter-support bracket.
2. Guide the rubber extensions through the apertures.
3. Use needle-nosed pliers to pull the extensions through the apertures.

4. Reconnect cables.
5. Replace the frame-support bracket.
6. Replace the side cover.

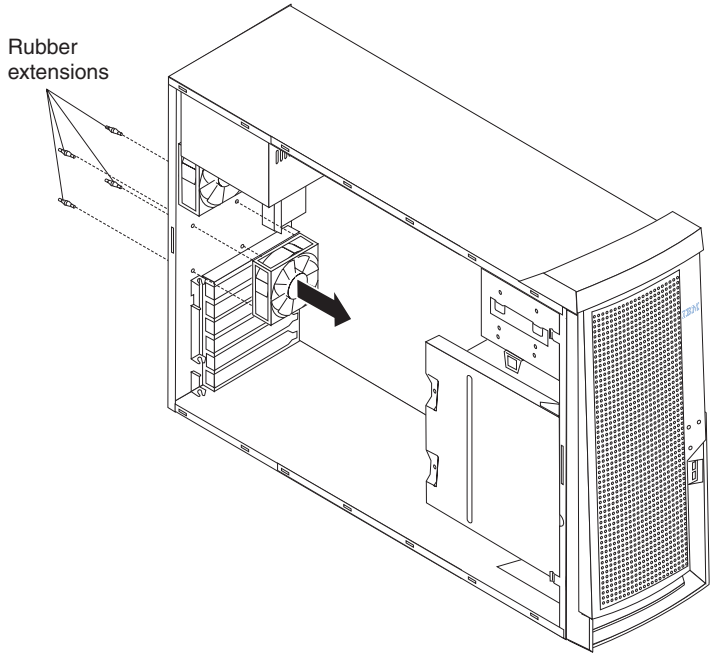
Rear fans

Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove a rear fan, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
5. Remove the airflow guide and air baffle.
6. Remove the fan cable from the system board.
7. Use side cutters to sever the four rubber extensions on the outside of the server.
8. Gently pry the fan away from the server and lift it up and out.



To install the new rear fan assembly, complete the following steps:

1. Place the fan in position at the rear of the server.
2. Guide the rubber extensions through the apertures.
3. Use needle-nosed pliers to pull the extensions through the apertures.
4. Reconnect cables.

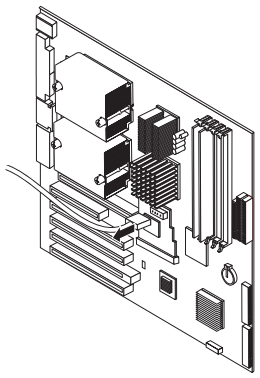
Mini-PCI video adapter

Before you begin:

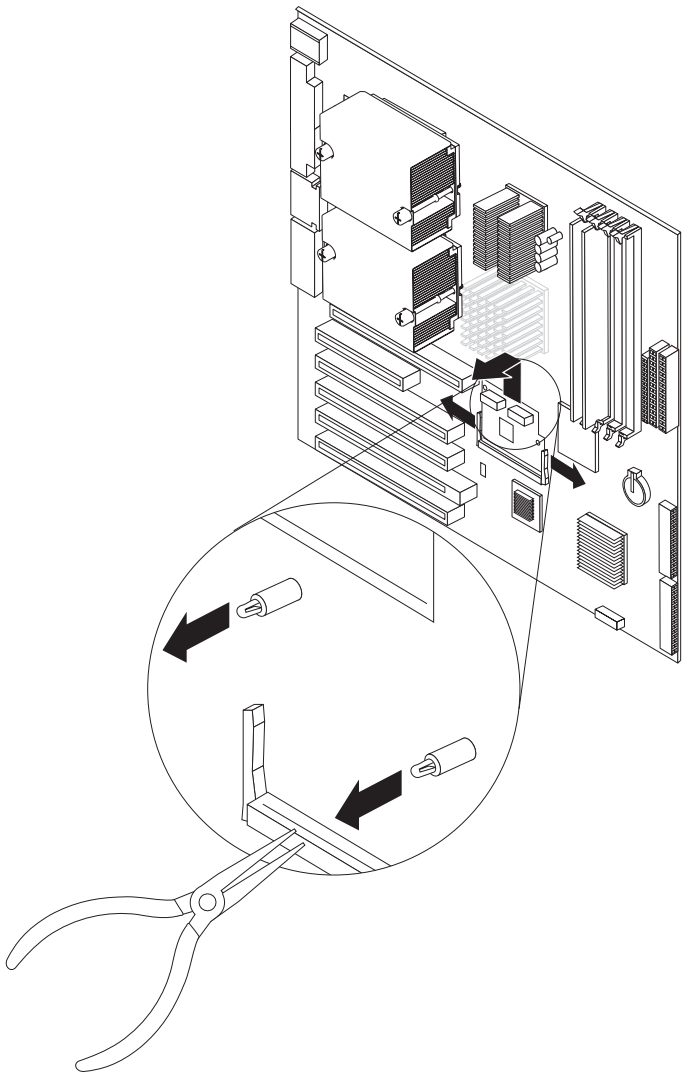
- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the mini-PCI card, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
5. Remove both adapter-retaining brackets and the adapter in PCI adapter slot 1 (see “Installing an adapter” on page 42).
6. Disconnect the cables.
7. Remove the air flow guide and the air baffle from over the microprocessor.
8. Find the video adapter in the mini-PCI type III slot on the system board, and remove the video cable from the connector on the adapter.



9. Using a pair of pliers, squeeze the stand-off pins and pull the mini-PCI card up and out of the slot.



Note: The AGP Pro slot and PCI slot 1 must be empty for you to install a video adapter in the mini-PCI Type III slot. Install the video adapter before installing an optional PCI adapter.

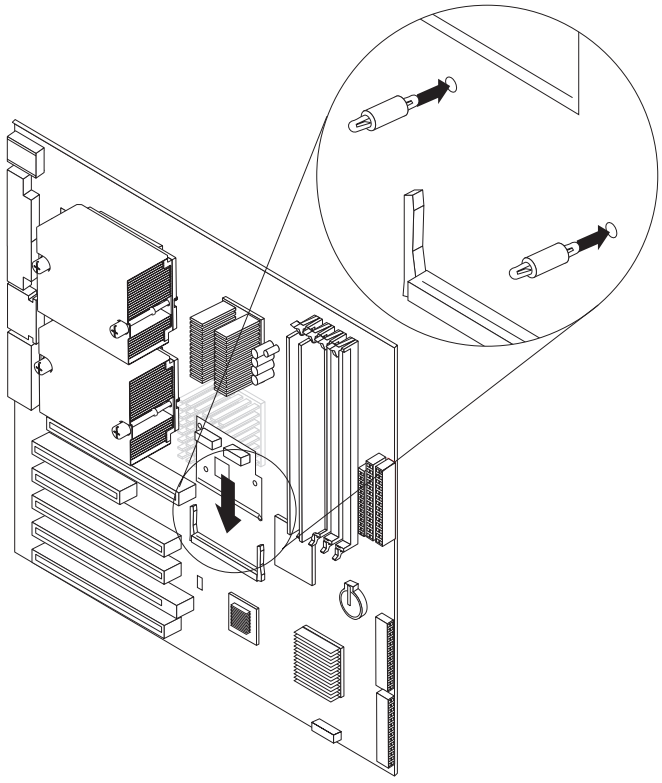
Complete the following steps to replace the video adapter in the mini-PCI type III slot of your server:

1. Review “Safety information” on page 125 and “Installation guidelines” on page 36.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 39).
5. Temporarily remove any adapters installed in PCI slot 1 (see “Installing an adapter” on page 42). Temporarily store these adapters in a static-protective location.

6. Locate the mini-PCI slot on the system board. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.
7. Remove the adapter from the static-protective package. Move the adapter directly from the static-protective package to the adapter slot. Avoid touching the components and gold-edge connectors on the adapter.
8. Install the adapter.
   a. Turn the adapter so that the adapter keys align correctly with the mini-PCI type III connector (PCI2) on the system board.

      Attention: To avoid breaking the retaining clips or damaging the connectors, handle the clips gently.

   b. Insert the adapter into the connector at a slight angle and then press it toward the system board until the retaining clips snap into the closed positions. Also, make sure that the two stand-offs on the system board come through their holes in the video adapter and lock it in place.



Note: If there is a gap between the adapter and the retaining clips, the adapter has not been properly installed. In this case, open the retaining clips and remove the adapter; then, reinsert the adapter. You might need to disengage the locking clips on the two stand-offs to remove the adapter.

Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.

9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.

10. Replace any adapters that were removed in step 5 (see “Installing an adapter” on page 42).
11. If you have other options to install, do so now.
12. Replace the air baffle and air flow guide.
13. Replace the frame-support bracket (see “Removing the frame-support bracket” on page 40).
14. Replace the side cover (see “Installing the side cover” on page 67).
15. Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Removing the system board

Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

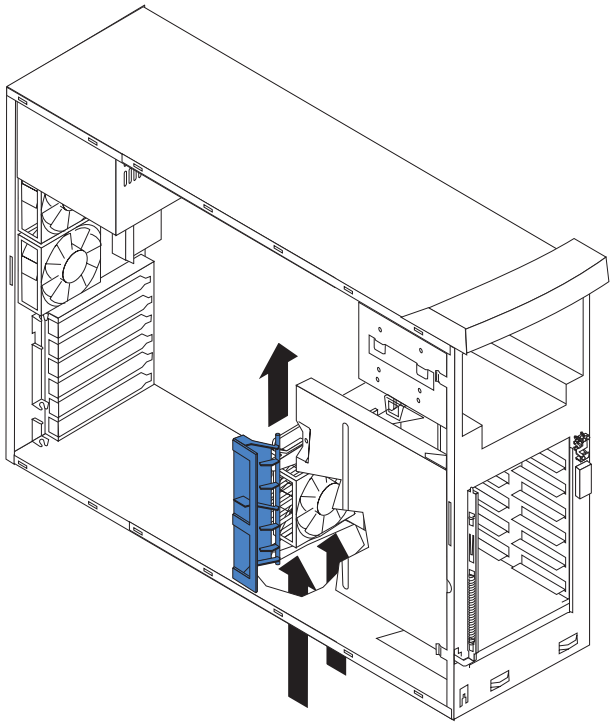
Notes:

1. When replacing the system board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.
2. It is recommended that the server be placed on its left side before performing this service procedure. Rotate the feet in toward the server so they do not detach due to the weight of the server.

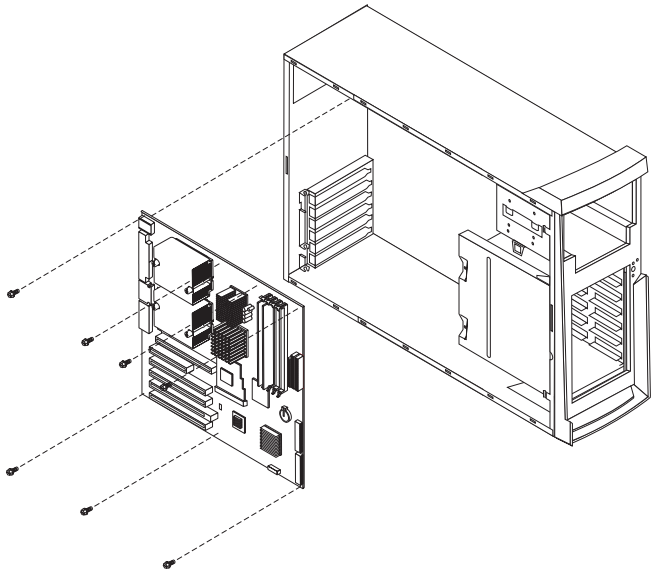
To remove the system board, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the front bezel. See “Removing the front bezel” on page 40.
5. Remove the frame-support bracket. See “Removing the frame-support bracket” on page 40.
6. Disconnect the cables.
7. Remove both adapter-retaining brackets and the adapters (see “Installing an adapter” on page 42).
8. Remove the air flow guide and the air baffles from over the microprocessor.
9. Remove memory modules. See “Installing memory modules” on page 55.
10. Remove the mini-PCI video adapter. See “Mini-PCI video adapter” on page 85.
11. Remove the microprocessor. See “Microprocessor and heat sink” on page 77.

12. Remove the front fan housing.



13. Remove mounting screws securing the system board to the chassis and lift the front of the system board to clear the locating pin; then, slide the board forward to clear the EMC shield.
14. Lift the system board out of the server chassis.



To replace the system board, reverse the steps.

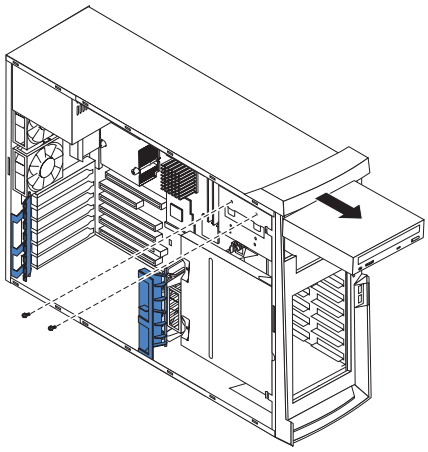
CD-ROM drive

Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the CD-ROM drive, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Disconnect the CD-ROM connector and power cables.
5. Remove the two screws from the CD-ROM drive cage.
6. Gently slide the CD-ROM drive toward the front of the server and lift it out.



For instructions to replace the CD-ROM drive, see “Installing a 5.25-inch removable-media drive” on page 52.

Diskette drive

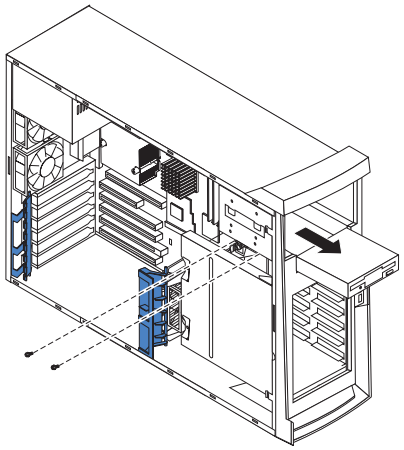
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the diskette drive, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Disconnect the cables.
5. Remove the two screws from the diskette drive cage.

6. Gently slide the diskette drive toward the front of the server and lift it out.



To replace the diskette drive, reverse the steps.

Top/side cover

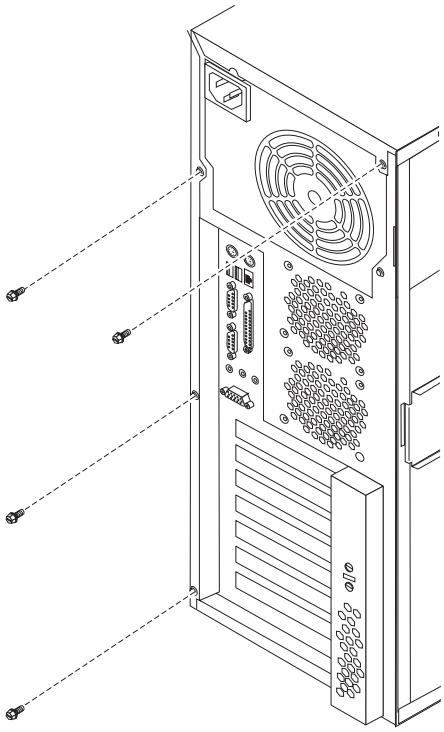
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the top/side cover, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the front bezel. See “Removing the front bezel” on page 40.
5. Remove the handle assembly. See “Handle assembly” on page 94.
6. Remove the four screws from the back of the server and put them in a safe place.

7. Using a screwdriver, gently pry the cover away from the server in the rear and slide the unit away from the server.



To replace the top/side cover, reverse the steps.

Bezel-release latch

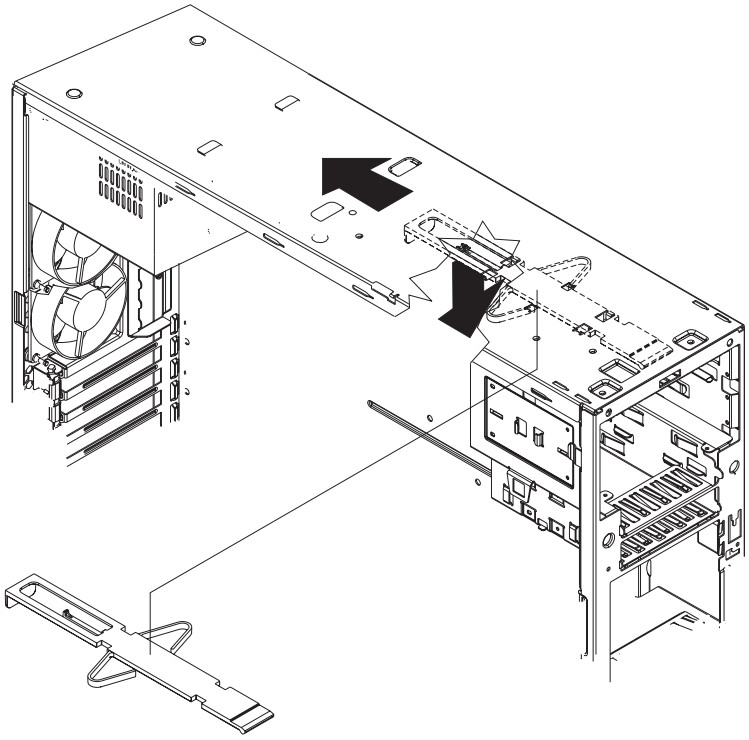
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the bezel-release latch, complete the following steps:

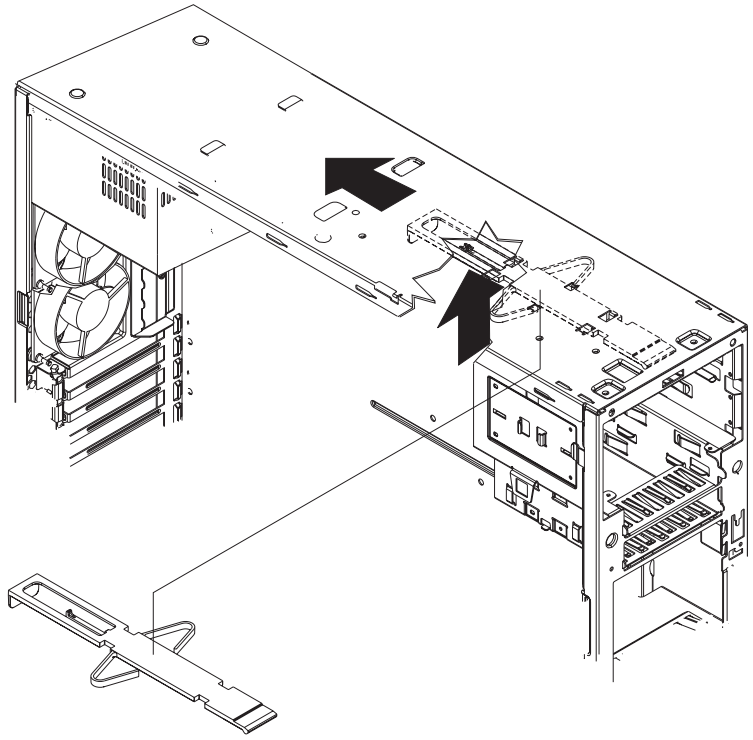
1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Remove the front bezel. See “Removing the front bezel” on page 40.
5. Remove the CD-ROM drive. See “CD-ROM drive” on page 90.
6. Pull down from inside the server to release the latch tab.

7. From the underside, grasp the bezel-release latch in the center, and gently pull it back and away from the server.



To replace the bezel-release latch, complete the following steps:

1. Align the bezel-release latch with the slots on the underside of the top of the chassis, and slide it into place.



2. Replace the CD-ROM drive. See “Installing a 5.25-inch removable-media drive” on page 52 for instructions.
3. Replace the front bezel. See “Replacing the bezel” on page 67.
4. Replace the side cover. See “Installing the side cover” on page 67.
5. Connect all external cables; then, connect the power cord, and plug in the server.
6. Turn on the server.

Handle assembly

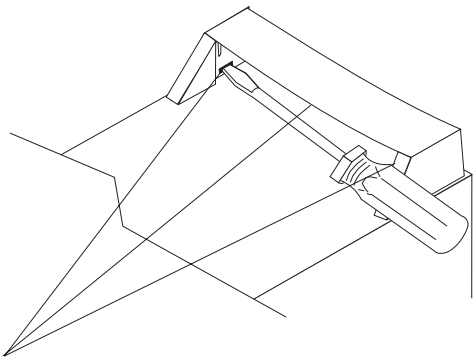
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the handle cap, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.

3. Use a flathead screwdriver to gently press in and down on the tabs located on the interior side wall of the handle.

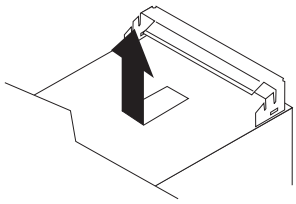


Tab locations

4. Lift up on the handle cap to separate it from the handle support.
5. Turn the system back to the tower-orientation; then, remove the top handle.
   a. Carefully use a flat-blade screwdriver to push in the tabs inside the plastic cover on the top of the system; then, remove the plastic cover. Store the cover for possible future use.
   b. Grasp the metal handle and slide it toward the rear of the server to remove it from your server. Store the metal handle for possible future use.

To remove the handle support, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Firmly grasp the handle support, and slide it away from the front bezel.
4. Lift up on the handle support to remove it from the slots in the top of the chassis.



To install the handle assembly, reverse the steps.

Rear-adapter retainer

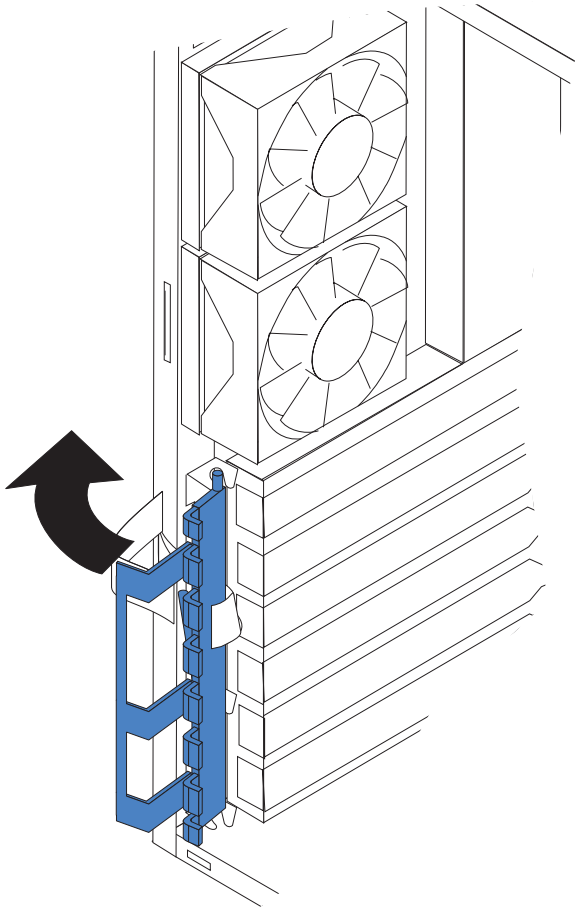
Before you begin:

- Read “Safety information” on page 125.
- Review the information in “System reliability considerations” on page 36.

To remove the rear-adapter retainer, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server, and disconnect the power cord; then, disconnect all external cables.
3. Remove the side cover. See “Removing the side cover” on page 39.
4. Rotate the rear-adapter retainer to the open position.

5. Grasp the rear-adapter retainer, and gently slide the top and bottom tabs out of the notches.



To replace the rear adapter retainer, reverse the steps.

Chapter 6. Symptom-to-FRU index

This index supports xSeries 225 servers.

Notes:

1. Check the configuration before you replace a CRU or FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices not supported by this index, see the manual for that device.
3. Always start with "General checkout" on page 19.

The symptom-to-FRU index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this symptom-to-FRU index to help you decide which FRUs to have available when servicing the server.

The first column of the two-column tables in this index lists error codes or messages, and the second column lists one or more suggested actions or FRUs to replace. Take the action (or replace the FRU) suggested first in the list of the second column, then try the server again to see if the problem has been corrected.

Note: Try reseating a suspected component or reconnecting a cable before replacing the component.

The POST BIOS code displays POST error codes and messages on the screen.

Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the examples in the following table.

Beeps	Description
1-2-3	• One beep • A pause (or break) • Two beeps • A pause (or break) • Three beeps
4	Four continuous beeps

One beep after successfully completing POST indicates the system is functioning properly.

Note: See "System replaceable units" on page 118 to determine which components should be replaced by a field service technician.	
Beep/symptom	**FRU/action**
1-1-2 (Microprocessor register test failed.)	Microprocessor
1-1-3 (CMOS write/read test failed.)	1. Battery 2. System board
1-1-4 (BIOS EEPROM checksum failed.)	1. Recover BIOS 2. System board

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Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Beep/symptom	**FRU/action**
1-2-1 (Programmable Interval Timer failed.)	System board
1-2-2 (DMA page register test failed.)	System board
1-2-3 (DMA page register write/read failed.)	System board
1-3-1 (First 64K RAM test failed.)	1. DIMM 2. Memory adapter
2-1-1 (Secondary DMA register failed.)	System board
2-1-2 (Primary DMA register failed.)	System board
2-1-3 (Primary interrupt mask register failed.)	System board
2-1-4 (Secondary interrupt mask register failed)	System board
2-2-2 (Keyboard controller failed.)	1. Keyboard 2. System board
2-2-3(CMOS power failure and checksum check failed.)	1. Battery 2. System board
2-4-1 (Video failed; screen believed operable.)	System board
3-1-1 (Timer tick interrupt failed.)	System board
3-1-2 (Interval timer channel 2 failed.)	System board
3-1-3 (RAM test failed above address OFFFFH.)	1. DIMM. 2. System board
3-1-4 (Time-Of-Day clock failed.)	1. Battery 2. System board
3-2-1 (Serial port failed.)	System board
3-2-2 (Parallel port failed.)	System board
3-2-3 (Math coprocessor test failed.)	1. Optional microprocessor 2. Microprocessor 3. System board
3-2-4 (Failure comparing CMOS memory size against actual.)	1. DIMM 2. Battery 3. System board
3-3-1 (Memory size mismatch occurred.)	1. DIMM 2. Battery 3. System board

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Beep/symptom	**FRU/action**
3-3-2 (Critical SMBus error occurred, I2C error)	1. Disconnect the server power cord from outlet, wait 30 seconds, and retry. 2. Microprocessor 3. DIMMs 4. DASD backplane 5. DASD power cable 6. System board

No-beep symptoms

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
No-beep symptom	**FRU/action**
No beep occurs during POST.	System board.
No beep, no video, and the system attention LED is off.	System board.
No beep, no video, and a system board error LED is on.	• See “System-board error LEDs” on page 26.
BIST failed.	Microprocessor

Diagnostic error codes

Note: In the following error codes, if *XXX* is *000*, *195*, or *197* **do not** replace a FRU. The description for these error codes are:

000 The test passed.

195 The **Esc** key was pressed to abort the test.

197 This is a warning error and may not indicate a hardware failure.

For all error codes, replace/follow the FRU/Action indicated.

Error Code/Symptom	FRU/Action
001-XXX-000 (Failed core tests)	System board
001-XXX-001 (Failed core tests)	System board
001-250-000 (Failed System Board ECC)	System board
001-250-001 (Failed Processor Board ECC)	System board
005-XXX-000 (Failed Video test)	1. Video adapter 2. System Board
011-XXX-000 (Failed COM1 Serial Port test)	1. Check loopback plug connected to externalized serial port. 2. Check cable from externalized port to system board. Should connect to Serial Port A on the system board (J52). 3. System Board.

Error Code/Symptom	FRU/Action
011-XXX-001 (Failed COM2 Serial Port test)	1. Check loopback plug connected to externalized serial port. 2. Check cable from externalized port to system board. Should connect to Serial Port B on the system board (J51). 3. System Board.
014-XXX-000 (Failed Parallel Port test)	System board
015-XXX-001 (USB interface not found, board damaged)	System board
015-XXX-198 (USB device connected during USB test)	1. Remove USB devices from USB1 and USB2. 2. System Board .
020-XXX-000 (Failed PCI Interface test)	System board
030-XXX-000 (Failed Internal SCSI interface test)	System board
035-XXX-099	1. Integrated RAID function on system board is damaged. 2. No RAID adapters were found. 3. If adapter is installed re-check connection.
035-XXX-S99 (Failed RAID test on PCI slot S, check System Error Log before replacing a FRU)	1. RAID Adapter 2. SCSI Backplane 3. Cable
035-XXX-SNN (Check System Error Log before replacing a FRU, NN = SCSI ID of failing fixed disk)	Fixed Disk with SCSI ID NN on RAID adapter in PCI slot S.
035-253-S99 (RAID adapter initialization failure)	1. ServeRAID Adapter in slot S is not configured properly. Obtain the basic and extended configuration status and refer to the ServeRAID Hardware Maintenance Manual for more information. 2. Cable. 3. SCSI Backplane. 4. Adapter.
089-XXX-001 (Failed Microprocessor test)	1. Microprocessor 1 2. System Board
089-XXX-002 (Failed Optional Microprocessor test)	1. Microprocessor 2 2. System Board
165-060-000 (Service Processor: RSA may be busy)	1. Rerun the diagnostic test. 2. Fix other error conditions that may be keeping ASM busy. Refer to the error log and diagnostic panel. 3. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 4. System Board. .

Error Code/Symptom	FRU/Action
165-198-000 (Service Processor: Aborted)	1. Rerun the diagnostic test. 2. Fix other error conditions that may be keeping ASM busy. Refer to the error log and diagnostic panel. 3. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 4. System Board.
165-201-000 (Service Processor: Failed)	1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 2. System Board.
165-330-000 (Service Processor: Failed)	Update to the latest ROM diagnostic level, and retry.
165-342-000 (Service Processor: Failed)	1. Ensure latest firmware levels for ASM and BIOS. 2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 3. System Board.
180-XXX-000 (Diagnostics LED failure)	Run Diagnostic LED test for the failing LED.
180-XXX-001 (Failed Front LED panel test)	Information LED Panel
180-XXX-002 (Failed Diagnostics LED panel test)	System board
180-XXX-003 (Failed System Board LED test)	System board
180-XXX-005 (Failed SCSI Backplane LED test)	1. SCSI Backplane 2. SCSI Backplane Cable 3. System Board
201-XXX-0NN (Failed Memory test, see “Installing memory modules” on page 55).	1. DIMM Location slots 1-4 where NN = DIMM location. **Note:** NN 1=DIMM 1 NN 2=DIMM 2 NN 3=DIMM 3 NN 4=DIMM 4 2. System Board
201-XXX-999 (Multiple DIMM failure, see error text)	1. See error text for failing DIMMs. 2. System Board.
202-XXX-001 (Failed System Cache test)	1. Microprocessor 1 2. System Board
202-XXX-002 (Failed System Cache test)	1. Microprocessor 2 2. System Board
206-XXX-000 (Failed Diskette Drive test)	1. Try test with another diskette. 2. Cable. 3. Diskette Drive. 4. System Board.
214-XXX-000 (Failed Diskette Drive test)	1. Try test with another diskette. 2. Cable. 3. Diskette Drive. 4. System Board.

Error Code/Symptom	FRU/Action
215-XXX-000 (Failed IDE CD-ROM test)	1. Try test with a different CD. 2. CD-ROM Drive Cables. 3. CD-ROM Drive. 4. System Board.
217-198-XXX (Could not establish drive parameters)	1. Check cable and termination. 2. SCSI backplane. 3. Fixed disk .
217-XXX-000 (Failed Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array	1. Fixed Disk 1 2. System Board
217-XXX-001 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array	1. Fixed Disk 2 2. System Board
264-XXX-0NN (Failed Tape Drive test)	1. Tape Cartridge, if user executed the Read/Write Tape Drive test (failure code of XXX = 256). 2. SCSI or Power Cable connected to tape drive with SCSI ID NN. 3. Tape Drive with SCSI ID NN. (Refer to the Help and Service Information appendix of the tape drive's User Guide.) 4. System Board or SCSI Controller. (Run SCSI Controller Diagnostic to determine if the SCSI bus is functioning properly.)
264-XXX-999 (Errors on multiple tape drives, see error text for more info)	See error messages/text in the PC Doctor error log for detailed information on each individual tape drive error.
301-XXX-000 (Failed Keyboard test)	1. Keyboard 2. System Board
405-XXX-000 (Failed Ethernet test on controller on the System Board)	1. Verify that Ethernet is not disabled in BIOS. 2. System Board.
405-XXX-A0N (Failed Ethernet test on adapter in slot A)	1. For A=0, system board 2. For A >0, adapter in PCI slot A
415-XXX-000 (Failed Modem test)	1. Cable **Note:** Ensure modem is present and attached to server. 2. Modem 3. System Board

Error symptoms

You can use the error symptom table to find solutions to problems that have definite symptoms.

If you cannot find the problem in the error symptom charts, run the diagnostic programs to test the server.

If you have just added new software or a new option and your server is not working, complete the following steps before using the error symptom charts:

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine if your server is running correctly.

3. Reinstall the new software or new device.

In the following table, if the entry in the FRU/action column is a suggested action, perform that action; if it is the name of a component, reseat the component and replace it if necessary. The most likely cause of the symptom is listed first.

Error Symptom	FRU/Action
CD is not working properly.	1. Clean the CD. 2. Run CD-ROM diagnostics. 3. CD-ROM Drive.
CD-ROM drive tray is not working. (The server must be powered-on)	1. Insert the end of a paper clip into the manual tray-release opening. 2. Run CD-ROM diagnostics. 3. CD-ROM Drive.
CD-ROM drive is not recognized.	1. Run Configuration/Setup, enable primary IDE channel. 2. Check cables and jumpers. 3. Check for correct device driver. 4. Run CD-ROM diagnostics. 5. CD-ROM Drive. 6. System Board.
Power switch does not work and reset button does work. (SW 1-1 is force power-on switch.)	1. Reseat connector. 2. Switch Card. 3. System Board.
Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work	1. If there is a diskette in the drive, verify that: a. The diskette drive is enabled in the Configuration/Setup utility program. b. The diskette is good and not damaged. (Try another diskette if you have one.) c. The diskette is inserted correctly in the drive. d. The diskette contains the necessary files to start the server. e. The software program is OK. f. Cable is installed correctly (proper orientation). 2. Run Diskette Drive Diagnostics. 3. Cable. 4. Diskette Drive. 5. System Board.
Monitor problems (general). Some IBM monitors have their own self-tests. If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.	1. Monitor. 2. Run Video Diagnostics. If diagnostics pass, the problem may be a video driver. 3. Display Adapter / System Board.
No video	1. Make sure correct machine is selected. 2. Make sure all cables are locked down.
Drives not recognized by the Fixed Disk diagnostic. (e.g. of 6 drives, the Fixed Disk test only shows 3)	Remove the first drive that doesn't show up and rerun the Fixed Disk diagnostic. If the remaining drives then show up, replace the drive you removed.
Hang during Fixed Disk diagnostic	Remove the hard disk drive being tested at the time of the hang. Rerun the diagnostic. If successful, replace the drive you removed.

Error Symptom	FRU/Action
Not all drives are recognized by fixed disk diagnostic.	1. Remove first drive that does not show up and rerun diagnostic. If remaining drives show up, replace the one that was removed. 2. If remaining drives do not show up, remove successive drives one at a time and rerun diagnostic.
System hangs during fixed disk diagnostic.	Remove hard drive being tested at the time of the hang and rerun the diagnostic. If successful, replace drive that was removed.

Note: See "System replaceable units" on page 118 to determine which components should be replaced by a field service technician.

Symptom to FRU list

Symptom	FRU/action
Microprocessor test failed.	Microprocessor
System timer test failed.	System board
Memory test failed.	• DIMM • System board
RAM refresh test failed.	System board
ECC controller logic.	System board
CMOS RAM test failed.	System board
Keyboard controller test failed.	System board
External cache test failed.	Microprocessor
PCI test failed.	System board
USB interface test failed.	System board
USB port test failed.	System board
Video test failed.	Mini-PCI video adapter
Serial port test failed.	System board
Parallel port test failed.	System board
SCSI controller test failed.	System board
Hard disk drive test failed.	1. Hard disk drive 2. Hard disk drive cable
Diskette drive test failed.	1. Diskette drive 2. Diskette drive cable 3. System board
Integrated SP test failed.	System board
System management test failed.	1. Remote Supervisor adapter, if installed. 2. System board.
CD-ROM test failed.	1. CD-ROM drive 2. CD-ROM drive cable 3. System board
Ethernet test failed.	System board
ServeRAID test failed.	RAID controller
Tape drive test failed.	Tape drive
BIOS timer test failed.	System board

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Symptom to FRU list	
Symptom	**FRU/action**
IRQ controller test tailed.	System board
DMA channels test failed.	System board
RAM refresh test failed.	System board
Real-time clock test failed.	System board
System board LED test failed.	System board
Cache test failed.	Microprocessor
Keyboard test failed.	1. Keyboard 2. System board
Speaker test failed.	System board
Mouse test failed.	1. Mouse 2. System board

Hot-swap power-supply LED errors

Use the information in this section to solve power-supply problems.

Note: The minimum configuration required for the dc good light to be lit is:
- Power supply
- Power cage assembly, if installed.
- System board (set switch 7 of SW1 to bypass the power switch; see “System board” on page 34.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.			
AC good LED	**DC good LED**	**Description**	**FRU/action**
Off	Off	No power to system or ac problem.	1. Check ac power to the system. 2. Power supply.
On	Off	Standby mode or dc problem.	1. Check system board cable connectors J4 and J10. Move switch 7 of SW 1 to bypass power control. If the dc good LED is lit, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems. If the system starts with no errors: a. Power switch assembly b. System board 2. Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Turn on the system. If the dc good LED is lit, replace the adapters and devices one at a time until you isolate the problem. 3. Power supply. 4. Power cage assembly, if installed. 5. System board.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.			
AC good LED	**DC good LED**	**Description**	**FRU/action**
On	On	Power is working properly.	N/A

POST error codes

In the following error codes, *X* can be any number or letter.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Error code/symptom	**FRU/action**
062 (Three consecutive boot failures using the default configuration.)	1. Run the Configuration/Setup Utility program. 2. Battery. 3. System board. 4. Microprocessor.
101, 102, 106 (Timer tick interrupt failure)	System board
102(Timer 2 test failure)	System board
106(Diskette controller error)	System board
129 (Internal cache (L1) error)	1. Optional microprocessor 2. Microprocessor
151 (Real time clock error)	1. Run diagnostics. 2. Battery. 3. System board.
161 (Real time clock battery error)	1. Run the Configuration/Setup Utility program. 2. Battery. 3. System board.
162 (Device configuration error) **Note:** Be sure to load the default settings and any additional desired settings; then, *save the configuration*.	1. Run the Configuration/Setup Utility program. 2. Battery. 3. Failing device. 4. System board.
163 (Real-time clock error)	1. Run the Configuration/Setup Utility program. 2. Battery. 3. System board.
164 (Memory configuration changed.)	1. Run the Configuration/Setup Utility program. 2. DIMM. 3. System board.
175(EEPROM CRC #1 damaged.)	System board
184 (Power-on password damaged)	1. Run the Configuration/Setup Utility program. 2. System board.
185 (Drive startup sequence information corrupted)	1. Run the Configuration/Setup Utility program. 2. System board.
187 (VPD serial number not set.)	1. Set serial number in the Configuration/Setup Utility program. 2. System board.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Error code/symptom	**FRU/action**
188 (EEPROM CRC #2 damaged.)	1. Run the Configuration/Setup Utility program. 2. System board.
189 (An attempt made to enter the system with invalid passwords)	1. Run the Configuration/Setup Utility program. 2. System board.
201 (Memory test error.)	1. DIMM 2. System board
229(Internal cache (L2) error)	1. Microprocessor 2. Optional microprocessor
289 (DIMM disabled by the user or system.)	1. Run the Configuration/Setup Utility program. 2. DIMM. 3. System board.
301 (Keyboard or keyboard controller error)	1. Keyboard 2. System board
303 (Keyboard controller error)	1. Replace the PS/2 keyboard with a USB keyboard. 2. System board.
602 (Invalid diskette boot record)	1. Diskette 2. Diskette drive 3. Drive cable 4. System board
604 (Diskette drive error)	1. Run the Configuration/Setup Utility program and diagnostics. 2. Diskette drive. 3. Drive cable. 4. System board.
662 (Diskette drive configuration error)	1. Run the Configuration/Setup Utility program and diagnostics. 2. Diskette drive. 3. Drive cable. 4. System board.
962 (Parallel port configuration error)	1. Run the Configuration/Setup Utility program. 2. System board.
1162(Serial port configuration error)	System board
11XX (System board serial port 1 or 2 error)	1. Run the Configuration/Setup Utility program. 2. System board.
1762 (Hard drive configuration error, IDE only.)	1. Hard disk drive. 2. Hard disk cables. 3. Run the Configuration/Setup Utility program. 4. System board.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Error code/symptom	**FRU/action**
178X (Hard drive error, IDE only.)	1. Hard disk cables 2. Hard disk adapter 3. Hard disk drive 4. System board
1800 (No more hardware interrupt available for PCI adapter.)	1. Run the Configuration/Setup Utility program. 2. Remove adapter.
1801 (No more ROM space available for PIC adapter.)	1. Run the Configuration/Setup Utility program. 2. Remove adapter. 3. Disable the adapter BIOs and run the Configuration/Setup Utility program.
1962 (Drive does not contain a valid boot sector)	1. Verify that a startable operating system is installed. 2. Run diagnostics. 3. Hard disk drive. 4. SCSI backplane. 5. Cable. 6. System board.
2462(Video configuration error)	System board.
5962 (IDE CD-ROM drive configuration error)	1. Run the Configuration/Setup Utility program. 2. CD-ROM drive. 3. CD-ROM power cable. 4. IDE cable. 5. System board. 6. Battery.
8603 (Pointing-device error)	1. Pointing device. 2. System board
00012000 (Machine check architecture error.)	1. Microprocessor. 2. System board.
00019502 (Microprocessor 1 failed)	1. Microprocessor. 2. System board
00180100(No room for PCI option ROM)	1. Run the Configuration/Setup Utility program. 2. Failing adapter. 3. System board.
00180200 (No more I/O space available for PCI adapter.)	1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180300 (No more memory above 1MB for PCI adapter.)	1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Error code/symptom	**FRU/action**
00180400(No memory below 1 MB for PCI adapter.)	1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180500 (PCI option ROM checksum error.)	1. PCI adapter. 2. System board.
00180600 (PCI device BIST failure. PCI bridge error.)	1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180700 (PCI device not responding.)	1. PCI adapter. 2. System board.
00181000 (General PCI error)	1. Adapter 2. System board
I9990650 (AC power has been restored)	1. Check cable. 2. Check for interruption of power. 3. Power cable.

Service processor error codes

When viewed from POST, Remote Supervisor Adapter error codes will appear in hexadecimal form (generally beginning with A2, A3, A4, A5, A6, A7, AD, AE, or E1). However, when viewed from the System Error Log, the messages will appear as text. To determine a possible error condition for the service processor, see the System Error Log (see “Viewing error logs from diagnostic programs” on page 22).

SCSI error codes

Error code	FRU/action
All SCSI Errors One or more of the following might be causing the problem: • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable	1. External SCSI devices must be turned on before you turn on the server. 2. Make sure that the cables for all external SCSI devices are connected correctly. 3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic. 4. Make sure that the last device in each SCSI chain is terminated correctly. 5. Make sure that the SCSI devices are configured correctly.

Temperature error messages

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
DASD Over Temperature (level-critical; direct access storage device bay *x* was over temperature)	Ensure that the system is being properly cooled; see “System reliability considerations” on page 36.
DASD Over recommended Temperature (sensor *x*) (level-warning; DASD bay *x* had over temperature condition)	Ensure that the system is being properly cooled; see “System reliability considerations” on page 36.
DASD under recommended temperature (sensor *x*) (level-warning; direct access storage device bay *x* had under temperature condition)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.
DASD Over Temperature (level-critical; sensor for DASD1 reported temperature over recommended range)	Ensure that the system is being properly cooled; see “System reliability considerations” on page 36.
Power supply *x* Temperature Fault (level-critical; power supply *x* had over temperature condition)	1. Ensure system is being properly cooled; see “System reliability considerations” on page 36. 2. Replace power supply *x*
System board is over recommended temperature (level-warning; system board is over recommended temperature)	1. Ensure system is being properly cooled; see “System reliability considerations” on page 36. 2. Replace the system board.
System board is under recommended temperature (level-warning; system board is under recommended temperature)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.
System over temperature for CPU *x* (level-warning; CPU x reporting over temperature condition)	Ensure system is being properly cooled**;** see “System reliability considerations” on page 36.
System under recommended CPU *x* temperature (level-warning; system reporting under temperature condition for CPU x)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.

Fan error messages

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
Fan *x* failure (level-critical; fan *x* had a failure)	1. Check connections to fan *x*. 2. Replace fan *x*.
Fan *x* fault (level-critical; fan *x* beyond recommended RPM range)	1. Check connections to fan *x*. 2. Replace fan *x*.
Fan *x* outside recommended speed action	Replace fan *x*.

Power error messages

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
Power supply *x* current share fault (level-critical; excessive current demand on power supply *x*)	Replace power supply *x*.
Power supply *x* DC good fault (level-critical; power good signal not detected for power supply *x*)	Replace power supply *x*.
Power supply *x* temperature fault	Replace power supply *x*.
Power supply *x* removed	No action required - information only.
Power supply *x* fan fault (level-critical; fan fault in power supply *x*)	Replace power supply *x*.
Power supply *x* 12 V fault (level-critical; overcurrent condition detected)	See “Power checkout” on page 29.
Power supply *x* 3.3 V fault (level-critical; 3.3 V power supply *x* had an error)	See “Power checkout” on page 29.
Power supply *x* 5 V fault (level-critical; 5 V power supply *x* had an error)	See “Power checkout” on page 29.
System running non-redundant power (level-noncritical; system does not have redundant power)	1. Add another power supply. 2. Remove options from system. 3. System can continue to operate without redundancy protection if steps1 and 2 are not followed.
System under recommended voltage for *x* (level-warning; indicated voltage supply under nominal value; value for *x* can be +12, -12, or +5)	1. Check connections to the power subsystem. 2. Power supply. 3. Power cage assembly, if installed.

System shutdown

See the following tables when experiencing system shutdown related to voltage or temperature problems.

Voltage related system shutdown

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
System shutoff due to *x* current over max value (level-critical; system drawing too much current on voltage *x* bus)	See “Power checkout” on page 29.
System shutoff due to *x* V over voltage (level-critical; system shutoff due to *x* supply over voltage)	1. Check the power-supply connectors. 2. Power supply. 3. Power cage assembly, if installed.
System shutoff due to *x* V under voltage (level-critical system shutoff due to *x* supply under voltage)	1. Check the power-supply connectors. 2. Power supply. 3. Power cage assembly, if installed.

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
System shutoff due to VRM x over voltage	Replace VRM *x*.
System shutoff due to excessive (< 240 VA) loading	1. See “Power checkout” on page 29. 2. Cycle ac on/off.

Temperature related system shutdown

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
System shutoff due to board over temperature (level-critical; board is over temperature)	1. Ensure that the system is being properly cooled; see “System reliability considerations” on page 36. 2. Replace board.
System shutoff due to CPU x over temperature (level-critical; CPU *x* is over temperature)	1. **E**nsure that the system is being properly cooled; see “System reliability considerations” on page 36. 2. Replace CPU *x*.
System shutoff due to CPU *x* under temperature (level-critical; CPU *x* is under temperature)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.
System shutoff due to DASD temperature (sensor *x*) (level-critical; DASD area reported temperature outside recommended operating range)	Ensure that the system is being properly cooled; see “System reliability considerations” on page 36.
System shutoff due to high ambient temperature (level-critical; high ambient temperature)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.
System shutoff due to system board under temperature (level-critical; system board is under temperature)	Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.

DASD checkout

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
Hard drive *x* removal detected (level-critical; hard drive *x* has been removed)	Information only; take action as appropriate.

Host built-in self test (BIST)

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Message	**Action**
Host fail (level-informational; built-in self-test for the host failed)	1. Reseat the microprocessor. 2. Replace the microprocessor.

Bus fault messages

Note: See “System replaceable units” on page 118 to determine which components should be replaced by a field service technician.	
Bus fault messages	**Message Action**
Failure reading 12C device. Check devices on bus 0.	1. If installed, reseat the I2C cable between Remote Supervisor Adapter (in PCI slot 1/J14) and the Remote Supervisor Adapter connector on the system board. 2. Memory DIMMs. 3. System board.
Failure reading 12C device. Check devices on bus 1.	1. Reseat the I2C cable between the operator information panel and system board (J22). 2. Operator information panel. 3. System board.
Failure reading 12C device. Check devices on bus 2.	1. Reseat the cable between system board and the power supply (power cage assembly, if installed) (J10). 2. Power cage assembly, if installed. 3. Power supply. 4. System board.
Failure reading 12C device. Check devices on bus 3.	1. Reseat the cable between the DASD backplane and connector (J10) of system board. 2. DASD backplane. 3. System board.
Failure reading I2C device. Check device on bus 4.	System board

Undetermined problems

Use the information in this section if the diagnostic tests did not identify the failure, the devices list is incorrect, or the system is inoperative.

Notes:

1. Damaged data in CMOS can cause undetermined problems.
2. Damaged data in BIOS code can cause undetermined problems.

Check the LEDs on all the power supplies. If the LEDs indicate the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Be sure the server is cabled correctly.

3. Remove or disconnect the following devices (one at a time) until you find the failure (turn on the server and reconfigure each time):
   Any external devices
   Surge suppressor device (on the server)
   Modem, printer, mouse, or non-IBM devices
   Each adapter
   Drives
   Memory modules (minimum requirement = 256 MB (2 banks of 128 MB DIMMs))

   Note: Minimum operating requirements are:
   a. One power supply
   b. Power cage assembly, if installed.
   c. System board
   d. One microprocessor and VRM
   e. Memory module (with a minimum of two 128 MB DIMMs)
4. Turn on the server. If the problem remains, suspect the following FRUs in the order listed:
   Power supply
   Power cage assembly, if installed
   System board

Notes:

1. If the problem goes away when you remove an adapter from the system and replacing that adapter does not correct the problem, suspect the system board.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

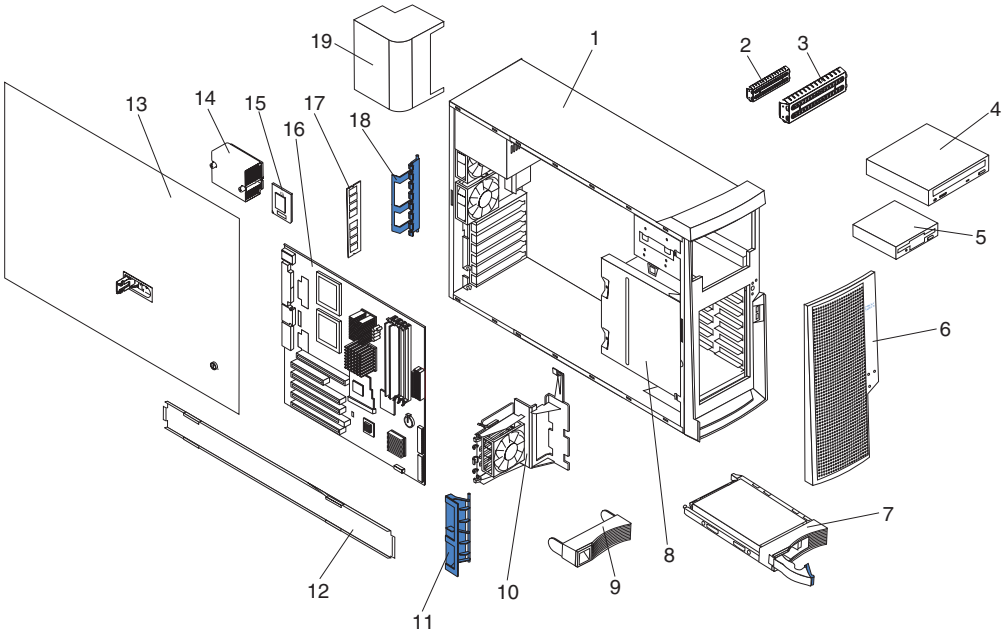
Note: To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between ″working″ and ″non-working″ systems will often lead to problem resolution.

Chapter 7. Parts listing xSeries 225 Type 8647

This parts listing supports the xSeries 225 Type 8647.



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System replaceable units

Note: Field replaceable units (FRUs) should be serviced only by qualified field service technicians. Customer replacement units can be replaced by the customer.

Index	System (xSeries 225, Type 8647)	FRU No.	CRU/FRU
1	Chassis (all models)	59P4820	FRU
2	3.5 EMC shield (all models)	32P8503	FRU
3	5.25 EMC shield (all models)	19K5548	FRU
4	CD-ROM drive, 48X (primary) (all models)	33P3207	CRU
4	CD-ROM drive, 48X (alternate) (all models)	33P3211	CRU
5	Diskette drive, black (all models)	76H4091	CRU
6	Bezel assembly (all models)	59P4791	CRU
7	Hard disk drive, 36.4 GB SCSI (model 2AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG)	24P3704	CRU
7	Hard disk drive, 36.4 GB SCSI (models 22X, 32X, 22G, 42G, 42X, 52G, 52X)	24P3704	CRU
8	Hard disk drive cage assembly, kit (models 02AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG)	59P4906	FRU
9	Bezel kit (all models)	00N7082	CRU
	• Filler bezel (2)		
	• Blank bezel (2)		
10	Fan 80 mm duct assembly all models)	59P4888	FRU
11	Front adapter support (all models)	19K4936	FRU
12	Support bracket assembly (all models)	59P4831	CRU
13	Cover, side/top (all models)	59P4824	CRU
14	Heat sink (all models)	25P6309	FRU
15	Microprocessor, 400/2.0 (models 22X, 2AX, 22G)	71P8243	FRU
15	Microprocessor, 533/2.4 (models 32X, 3AX, 3BX, 32G, 3CG)	59P4937	FRU
15	Microprocessor, 533/2.67 (models 42G, 42X, 4AX, 4BX, 4CG)	59P4840	FRU
15	Microprocessor, 533/2.8 (models 52G, 52X, 5AX, 5BX, 5CG)	59P4845	FRU
16	System board (all models)	59P2607	FRU
17	Memory, 128 MB PC2100 ECC DIMM (models 22X, 32X, 22G, 32G, 42X, 42G, 52X, 52G)	09N4305	CRU
17	Memory, 512 MB PC2100 ECC DIMM (models 2AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG)	09N4306	CRU
18	Rear adapter-retaining bracket (all models)	19K4945	FRU
19	Air baffle	24P1284	FRU
	Alcohol wipe kit (all models)	59P4739	FRU
	Battery, 3.0 V	33F8354	CRU
	Bezel, door assembly (all models)	59P4828	FRU
	Bezel, front (all models)	59P4823	FRU
	Bezel kit (all models)	19K4951	CRU
	• Plug, front		
	• Plug, USB		
	Cable, 1-drop Ultra 320 SCSI hot-swap backplane (models 2AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG,)	59P4201	FRU
	Cable, 4-drop Ultra 320 SCSI (models 22X, 32X, 22G, 32G, 42X, 42G, 52X, 52G)	59P2614	FRU
	Cable, 2-drop ATA-66 (all models)	37L5098	FRU
	Cable, CD-ROM audio (all models)	75H9219	FRU
	Cable, diskette drive (all models)	76H4228	FRU
	Cable, interposer CB (models 2AX, 3AX, 4AX, 5AX)	59P4792	FRU
	Cable, video (all models)	71P8472	FRU

Index	System (xSeries 225, Type 8647)	FRU No.	CRU/FRU
	Cable, UDB (all models)	59P4808	FRU
	Cage, dual power supply (models 3BX, 4BX, 5BX)	59P4909	FRU
	Door assembly, sliding (all models)	59P4825	FRU
	Fan 80 mm (all models)	59P2572	FRU
	Fan, 92x38 fix speed (all models)	59P4893	FRU
	Feet snap-in (4) (all models)	12J4506	FRU
	Feet, system kit (all models)	12J4506	FRU
	Guide, card (all models)	59P2626	FRU
	Handle cap (all models)	59P4889	FRU
	Hard disk drive backplane (models 2AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG)	59P5159	FRU
	Hard disk drive rail (all models)	23P1328	CRU
	Lock assembly (all models)	59P4822	FRU
	Lock bar (2AX, 3AX, 3BX, 3CG, 4AX, 4BX, 4CG, 5AX, 5BX, 5CG)	59P2629	FRU
	Miscellaneous hardware kit (all models)	09N5764	CRU
	• Screw, M3.5 (7) • Gasket, EMC two position (1) • Bracket, I/O blank (1) • Bracket, power supply (1) • Support, blank isolator (4) • Bracket, key holder (1) • Screw, M3X5 slotted (4) • Clip (1) • Spacer, system board (4) • Clamp, SCSI cable (1) • Screw, M3.5 slotted (6)		
	Module, retention (models 22X, 22G, 2AX)	06P6350	FRU
	Module, retention (models 32X, 3AX, 3BX, 32G, 3CG, 42X, 4AX, 4BX, 42G, 4CG, 52X, 5AX, 5BX, 52G, 5CG)	71P8107	FRU
	Mouse (all models)	24P0383	CRU
	Panel, air (all models)	59P4829	FRU
	Panel assembly (all models)	24P2621	FRU
	Panel, control	24P2621	FRU
	PCI video adapter (all models)	59P2705	CRU
	Power button (all models)	19K4940	FRU
	Power cord (all)	93F2364	CRU
	Power supply, 425 watt (models 22X, 2AX, 32X, 3AX, 32G, 3CG, 42X, 4AX, 42G, 4CG, 52X, 5AX, 52G, 5CG)	49P2042	FRU
	Power supply, 350 watt hot-swap (models 3BX, 4BX, 5BX)	49P2033	CRU
	Remote supervisor adapter	09N7585	CRU
	Retainer, I/O cards (all models)	59P4790	FRU
	SCSI card (models 3CG, 4CG, 5CG)	02R0970	CRU
	Thermal grease kit (all models)	59P4740	FRU

Keyboards (CRUs)

Keyboard	CRU No.
US English	37L2551
French Canadian	37L2552
LA Spanish	37L2553
Arabic	37L2555
Belgium/French	37L2556

Keyboard	CRU No.
Belgium/UK	37L2557
Bulgarian	37L2558
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Korean	02K0901
Iceland	37L2567
Italy	37L2568
Norwegian	37L2569
Polish	37L2570
Portuguese	37L2571
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slavic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577
Swiss, French/German	37L2578
Turkish	37L2579
Turkish	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

Power cords (CRUs)

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is http://www.ibm.com/eserver/xseries/. The address for IBM IntelliStation information is http://www.ibm.com/pc/intellistation/.

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You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/. If you click **Profile** from the support page, you can create a customized support page. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, go to http://www.ibm.com/services/, or go to http://www.ibm.com/planetwide/ for support telephone numbers.

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to http://www.ibm.com/planetwide/ for support telephone numbers.

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Appendix B. Related service information

The service procedures are designed to help you isolate problems. They assume that you have model-specific training on all computers, or that you are familiar with the computers, functions, terminology, and service information provided in this manual.

Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM computer.

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  Remember: Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

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Electrical safety

CAUTION:
Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

    Remember: Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.

- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Turn off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.

4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the server, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD-protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those in the following list, to provide protection that meets the specific service requirement.

  Note: The use of a grounding system is desirable but not required to protect against ESD damage.

  – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  – Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
  – Use the round ground-prong of the ac plug on ac-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices (multilingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English

- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Japanese
- Korean
- Spanish

Important: All caution and danger statements in this IBM documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in this section.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in this section under statement 1.

Be sure to read all caution and danger statements before performing any of the instructions.

- Statement 1

DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedure**s.
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

- Statement 2

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

- Statement 3

CAUTION:
When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER: Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

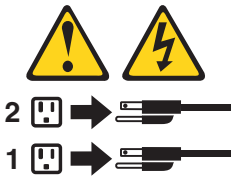
- Statement 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

- Statement 5

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



- Statement 23

CAUTION:

Do not place any object weighing more than 50 kg (110 lbs.) on top of rack-mounted devices.

Importante:

Todas as instruções de cuidado e perigo da IBM documentation começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

Instrução 1

PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:

- Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
- Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
- Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

Para Conectar:	**Para Desconectar:**
1. DESLIGUE Tudo. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos.	1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos dispositivos.

Instrução 2

CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:
- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

Instrução 3

PRECAUCIÓN:

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ítica, transmissores, etc.) estiverem instalados, observe o seguinte:
- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos íticos, e evite exposição direta ao raio.

Instrução 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

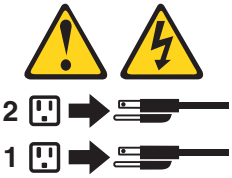
CUIDADO:

Ao levantar a máquina, faça-o com segurança.

Instrução 5

CUIDADO:

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.



CUIDADO:

Instrução 23

CUIDADO:

Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.

重要：

Server Library 中的所有提醒和危险条款前都有一个数字标识。该数字是用来交叉引用一个英文的提醒和危险条款及本部分中的与之对应的已翻译成其它文字的提醒和危险条款。

例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

声明 1

危险

电源、电话和通信电缆中带有危险电流。

为避免电击：

雷电期间不要拆接电缆或安装、维修及重新配置本产品。

将所有电源线连接至正确布线并已安全接地的电源插座上。

将应与本产品连接的所有设备连接至正确布线的插座上。

尽量只使用单手拆接信号电缆。

有水、火及结构损坏迹象时，请勿打开任何设备。

除非在安装配置过程中有明确指示，否则，打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。

安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。

连接时：	断开连接时：
1. 关闭所有设备。	1. 关闭所有设备。
2. 首先将所有电缆连接至设备。	2. 首先从插座中拔出电源线。
3. 将信号电缆连接至接口。	3. 从接口上拔下信号电缆。
4. 将电源线连接至插座。	

声明 2

警告：

更换锂电池时，只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同类型的电池。

如果系统模块中含有锂电池，则只能使用同一厂商制造的同一类型的模块进行更换。电池中含有锂，如果使用、拿放或处理不当，可能会发生爆炸。

请勿对电池进行下列操作：
扔入或浸入水电　　。
加热超过 100 （212 F）
进行修理或分解
请按本地法规要求处理电池。

声明 3

警告：

安装激光产品（如 CD-ROM、DVD 驱动器、光纤设备或送话器）时，应注意以下事项：

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险，本设备中没有用户可维修的部件。

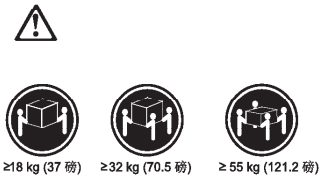
非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的危险。

危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

打开时会产生激光辐射。不要直视光束，不要使用光学仪器直接观看光束，避免直接暴露于光束之下。

声明 4

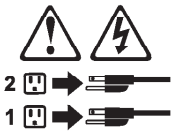


警告：
抬起时请采用安全操作方法。

声明 5

警告：

使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。另外，本设备可能带有多条电源线。如要断开设备上的所有电流，请确保所有电源线均已与电源断开连接。



声明 6

警告：

如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至使用方便的电源。

声明 23

警告：

机柜安装的设备上面不能放置重于 50kg（110 磅）的物品。

> 50 kg (110 磅)

重要資訊：

Server Library 中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1

危險

電源、電話及通信電纜上所產生的電流均有危險性。

欲避免電擊危險：

- 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：	切斷：
1. 關閉所有開關。	1. 關閉所有開關。
2. 先將所有電纜線接上裝置。	2. 先自電源插座拔掉電源線。
3. 將信號電纜接上接頭。	3. 拔掉接頭上的所有信號電纜。
4. 再將電源線接上電源插座。	4. 再拔掉裝置上的所有電纜線。
5. 開啓裝置的電源。	

聲明 2

注意：

更換鋰電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：

- 丟入或浸入水中
- 加熱超過 100 ℃ (212 ℉)
- 修理或拆開

請遵照當地法令規章處理廢棄電池。

聲明 3

注意：

安裝雷射產品 (如 CD-ROM、DVD 光碟機、光纖裝置或發射器) 時，請注意下列事項：

– 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。裝置中沒有需要維修的組件。
– 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。

危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

聲明 4

≥ 18 公斤 (37 磅)

≥ 32 公斤 (70.5 磅)

≥ 55 公斤 (121.2 磅)

注意：

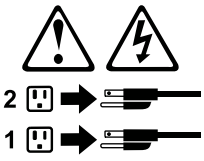
抬起裝置時，請注意安全措施。

聲明 5

注意：

裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。

本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。



聲明 23

注意：
請勿將任何重量超過 50 公斤 (110 磅) 的物品置於已安裝機架的裝置上方。

>50 公斤 (110 磅)

Important:

Toutes les consignes Attention et Danger indiquées dans la bibliothèque IBM documentation sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Notice n° 1

DANGER

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux.

Pour éviter tout risque de choc électrique:

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités hors tension. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités sous tension.	1. Mettez les unités hors tension. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.

Notice n° 2

ATTENTION:

Remplacez la pile au lithium usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- **Ne la jetez pas à l'eau.**
- **Ne l'exposez pas à une température supérieure à 100 °C.**
- **Ne cherchez pas à la réparer ou à la démonter.**

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

Notice n° 3

ATTENTION:

Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:

- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.**

DANGER

Certains produits laser contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. évitez une exposition directe au rayon.

Notice n° 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

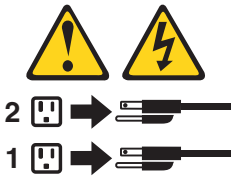
ATTENTION:

Faites-vous aider pour soulever ce produit.

Notice n° 5

ATTENTION:

Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.



Notice n° 23

ATTENTION:

Ne posez pas d'objet dont le poids dépasse 50 kg sur les unités montées en armoire.

Wichtig:

Alle Sicherheitshinweise in dieser IBM documentation beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1

VORSICHT

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Signalkabel möglichst einhändig anschließen oder lösen.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

Kabel anschließen:	**Kabel lösen:**
1. Alle Geräte ausschalten und Netzstecker ziehen. 2. Zuerst alle Kabel an Einheiten anschließen. 3. Signalkabel an Anschlußbuchsen anschließen. 4. Netzstecker an Steckdose anschließen. 5. Gerät einschalten.	1. Alle Geräte ausschalten. 2. Zuerst Netzstecker von Steckdose lösen. 3. Signalkabel von Anschlußbuchsen lösen. 4. Alle Kabel von Einheiten lösen.

Hinweis 2

ACHTUNG:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:
- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

Hinweis 3

ACHTUNG:

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.

- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.
- Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

Hinweis 4

≥18 kg ≥32 kg ≥55 kg

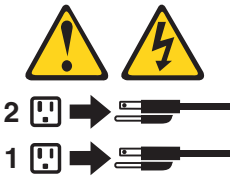
ACHTUNG:

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5

ACHTUNG:

Mit dem Betriebsspannungsschalter an der Vorderseite des Servers und dem Betriebsspannungsschalter am Netzteil wird die Stromversorgung für den Server nicht unterbrochen. Der Server könnte auch mehr als ein Netzkabel aufweisen. Um die gesamte Stromversorgung des Servers auszuschalten, muß sichergestellt werden, daß alle Netzkabel aus den Netzsteckdosen herausgezogen wurden.



Hinweis 23

ACHTUNG:

Keine Gegenstände, die mehr als 50 kg wiegen, auf Rack-Einheiten ablegen.

Importante:

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione IBM documentation iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1

PERICOLO

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:

- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.
- Collegare tutti i cavi di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Quando possibile, collegare o scollegare i cavi di segnale con una sola mano.
- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegare:	**Per scollegare:**
1. SPEGNERE tutti i dispositivi. 2. Collegare prima tutti i cavi alle unità. 3. Collegare i cavi di segnale ai connettori. 4. Collegare i cavi di alimentazione alle prese elettriche. 5. ACCENDERE le unità.	1. SPEGNERE tutti i dispositivi. 2. Rimuovere prima i cavi di alimentazione dalle prese elettriche. 3. Rimuovere i cavi di segnale dai connettori. 4. Rimuovere tutti i cavi dalle unità.

Avviso 2

ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:
- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100°C
- Cercare di ripararla o smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

Avviso 3

ATTENZIONE:

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:
- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

PERICOLO

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

Avviso 4

≥18 kg ≥32 kg ≥55 kg

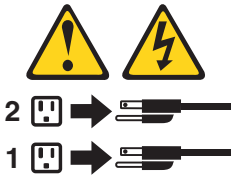
ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

ATTENZIONE:

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità. L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.



Avviso 23

ATTENZIONE:

Non poggiare oggetti che pesano più di 50 kg sulla parte superiore delle unità montate in rack.

重要：

Netfinity Server　ライブラリーにあるすべての注意および危険の記述は
数字で始まります。この数字は、英語版の注意および危険の記述と翻訳さ
れた注意および危険の記述を相互参照するために使用します。

例えば、もし注意の記述が数字の１で始まってる場合は、その注意の翻訳は、
記述１　の下にあります。

手順を実施する前に、すべての注意;

・記述　1

⚠ 危険

感電を防止するため、雷の発生時には、いかなるケーブルの
取り付けまたは取り外しも行わないでください。また導入、
保守、再構成などの作業も行わないでください。

感電を防止するため ：

- 電源コードは正しく接地および配線が行われている
  電源に接続してください。
- 本製品が接続されるすべての装置もまた正しく配線
  された電源に接続されている必要があります。

できれば、信号ケーブルに取り付けまたは取り外しのとき
は片方の手のみで行うようにしてください。これにより、
電位差がある二つの表面に触ることによる感電を防ぐことが
できます。

電源コード、電話ケーブル、通信ケーブルからの電流は身体に
危険を及ぼします。設置、移動、または製品のカバーを開けたり
装置を接続したりするときには、以下のようにケーブルの接続 、
取り外しを行ってください。

接続するには	取り外すには
1. すべての電源を切る 2. まず、装置にすべての ケーブルを接続する。 3. 次に、通信ケーブルを コネクターに接続する 4. その後、電源コンセントに 電源コードを接続する 5. 装置の電源を入れる。	1. すべての電源を切る 2. まず、電源コンセントから 電源コードを取り外す 3. 次に、通信ケーブルを コネクターから取り外す。 4. その後、装置からすべての ケーブルを取り外す

・記述 2

⚠ 注意

本製品には、システム・ボード上にリチウム電池が使用さ
れています。電池の交換方法や取り扱いを誤ると、発熱、
発火、破裂のおそれがあります。
電池の交換には、IBM部品番号33F8354の電池またはメーカー
推奨の同等の電池を使用してください。
交換用電池の購入については、お買い求めの販売店または
弊社の営業担当までお問い合わせください。
電池は幼児の手の届かない所に置いてください。
万一、幼児が電池を飲み込んだときは、直ちに医師に相談
してください。
以下の行為は絶対にしないでください。
－水にぬらすこと
－100度C 以上の過熱や焼却
－分解や充電
－ショート
電池を廃棄する場合、および保存する場合にはテープなど
で絶縁してください。他の金属や電池と混ざると発火、
破裂の原因となります。電池は地方自治体の条例、または
規則に従って廃棄してください。ごみ廃棄場で処分される
ごみの中に捨てないでください。

・記述 3

⚠ 注意

レーザー製品(CD-ROM、DVD、または光ファイバー装置または
送信器など)が組み込まれている場合は、下記に御注意ください。

- ここに記載されている制御方法、調整方法、または性能を超えて使用
  すると、危険な放射線を浴びる可能性があります。

- ドライブのカバーを開けると、危険な放射線を浴びる可能性があります。
  ドライブの内部に修理のために交換可能な部品はありません。カバーを
  開けないでください。

⚠ 危険

一部 CD-ROM ドライブは、Class 3A または Class 3B レーザー・
ダイオードを使用しています。 次の点に注意してください。

CD-ROMドライブのカバーを開けるとレーザーが放射されます。
光線をみつめたり、光学器械を使って直接見たりしないで
ください。また直接光線を浴びないようにしてください。

・記述 4

⚠ 注意

18Kg 以上

32Kg 以上

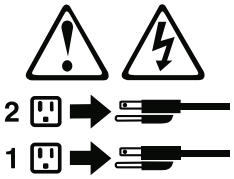
55Kg 以上

装置を持ち上げる場合は、安全に持ち上げる方法に従ってください。

・記述 5

⚠ 注意 ⚠

サーバーの前面にある電源制御ボタンは、サーバーに供給された
電流を遮断しません。
サーバーには、複数の電源コードが接続されているかもしれません。
サーバーから電流を完全に遮断するために、すべての電源コードが
電源から取り外されていることを確認してください。



・記述 23

⚠ 注意

ラック・モデルのサーバーの上に 50 Kg 以上の物を置かないで
ください。

> 50 Kg

중요:

본 *Server Library*에 있는 모든 주의 및 위험 경고문은 번호로 시작합니다. 이 번호는 영문 주의 혹은 위험 경고문과 이 절에 나오는 번역된 버전의 주의 혹은 위험 경고문을 상호 참조하는 데 사용됩니다.

예를 들어, 주의 경고문이 번호 1로 시작하면, 번역된 해당 주의 경고문을 본 절의 경고문 1에서 찾아볼 수 있습니다.

모든 지시사항을 수행하기 전에 반드시 모든 주의 및 위험 경고문을 읽으십시오.

경고문 1

위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의 설치, 유지보수 또는 재구성을 하지 마십시오.
- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.
- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에 연결하십시오.
- 가능한한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크 및 모뎀을 끊어 주십시오.
- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

연결하려면:	연결을 끊으려면:
1. 모든 스위치를 끕니다.	1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.	2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에 연결합니다.	3. 신호 케이블을 커넥터에서 제거합니다.
4. 콘센트에 전원 코드를 연결합니다.	4. 장치에서 모든 케이블을 제거합니다.
5. 장치 스위치를 켭니다.	

경고문 2

주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서 권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈 유형으로 교체하십시오. 배터리에 리튬이 있을 경우 제대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음을 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

주의:
레이저 제품(CD-ROMs, DVD 드라이브, 광 장치 또는 트랜스미터 등과 같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우 위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를 받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한 레이저 광선에 노출될 수 있습니다.

위험

일부 레이저 제품에는 클래서 3A 또는 클래스 3B 레이저 다이오드가 들어 있습니다. 다음을 주의하십시오.

열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

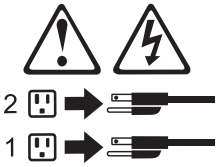
경고문 4

≥18 kg (37 lbs) ≥ 32 kg (70.5 lbs) ≥ 55 kg (121.2 lbs)

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5

주의:
장치의 전원 제어 버튼 및 전원 공급기의 전원 스위치는 장치에 공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가 연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면 모든 전원 코드가 전원으로부터 차단되어 있는 지 확인하십시오.



경고문 23

주의:
서랍형 모델의 장치 상단에 50 kg(110 lbs.)이 넘는 물체를 올려 놓지 마십시오.

> 50 kg (110 lbs)

Importante:

Todas las declaraciones de precauciín de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaraciín de precauciín o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta secciín.

Por ejemplo, si una declaraciín de peligro empieza con el número 1, las traducciones de esta declaraciín de precauciín aparecen en esta secciín bajo Declaraciín 1.

Lea atentamente todas las declaraciones de precauciín y peligro antes de llevar a cabo cualquier operaciín.

Declaración 1

PELIGRO

La corriente eléctrica de los cables telefínicos, de alimentaciín y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalaciín, mantenimiento o reconfiguraciín de este producto durante una tormenta.
- Conecte cada cable de alimentaciín a una toma de alimentaciín eléctrica con conexiín a tierra y cableado correctos.
- Conecte a tomas de alimentaciín con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de sent.al.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundaciín o de daños estructurales.
- Desconecte los cables de alimentaciín, sistemas de telecomunicaciones, redes y mídems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalaciín y configuraciín.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operaciín de instalaciín, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexin	Para la desconexiín
1. APÁGUELO todo. 2. En primer lugar, conecte los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Conecte cada cable de alimentaciín a la toma de alimentaciín. 5. ENCIENDA el dispositivo.	1. APÁGUELO todo. 2. En primer lugar, retire cada cable de alimentaciín de la toma de alimentaciín. 3. Retire los cables de señal de los conectores. 4. Retire los cables de los dispositivos.

Declaración 2

PRECAUCIÓN:

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:
- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislaciín local.

Declaración 3

PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra íptica o transmisores), tenga en cuenta las advertencias siguientes:

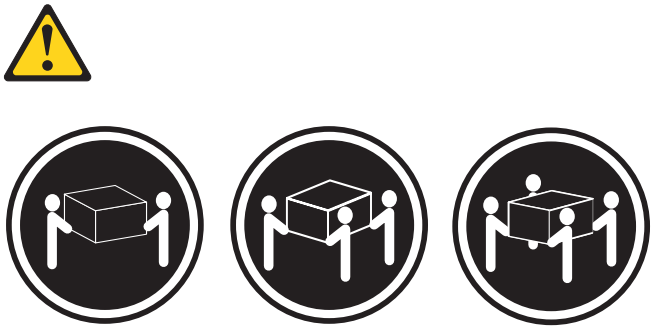
- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realizaciín de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposiciín perjudicial a las radiaciones.

PELIGRO

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiaciín láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ípticos; evite la exposiciín directa al rayo.

Declaración 4



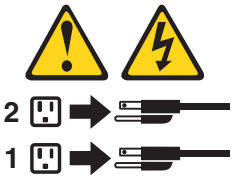
PRECAUCIÓN:

Tome medidas de seguridad al levantar el producto.

Declaración 5

PRECAUCIÓN:

El botín de control de alimentaciín del dispositivo y el interruptor de alimentaciín de la fuente de alimentaciín no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentaciín. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentaciín de la fuente de alimentaciín.



Declaración 23

PRECAUCIÓN:

No coloque ningún objeto que pese más de 50 kg (110 libras) encima de los dispositivos montados en bastidor.

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Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

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When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1000000 bytes, and GB stands for approximately 1000000000 bytes.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Avis de conformité à la réglementation d'Industrie Canada

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United Kingdom telecommunications safety requirement

Notice to Customers

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